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TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES

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SNAKE BITE AND ITS TREATMENT

by

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It is important that medical men called upon to treat snake bite should have a sound knowledge of the different types of snakes, and should be able to classify them. It is as important to be able to recognize the non-venomous as the venomous snakes, because much damage is still done by the indiscriminate use of potassium permanganate, incisions and tourniquets in the treatment of bites of harmless snakes, and by the unnecessary use of serum, which quite often leads to complications such as urticaria or anaphylaxis.

Five main families of snakes are found in Africa—Typhlopidae, Leptotyphlopidae, Boidae, Viperidae and Colubridae—but of these only the Viperidae and Colubridae are venomous. Many members of the Colubridae are fangless and harmless, and the venomous members can be divided into the front-fanged (cobra, ringhals, mamba) and the back-fanged (boomslang, skaapstekker). The Viperidae are all front-fanged and venomous, and include such snakes as the puff adder, the horned adder and the night adder.

In Rhodesia members of the viper family are the most likely to cause bites requiring treatment, and the night adder is the most frequent offender. The puff adder also accounts for many serious bites. Of the Colubridae the cobra seldom causes a human casualty by bite, but it spits its venom, which, if it reaches the eye, causes painful conjunctivitis. The boomslang rarely attacks man, but does occasionally give a poisonous bite; the bite of a mamba is very uncommon in Rhodesia.

The effects of snake bite, as is well known, differ greatly according to the species of snake. The viper venoms have a strong local action. The puff adder venom contains a strong haemolytic anticoagulant factor; the night adder venom is similar but much weaker. Boomslang venom also contains a powerful haemolytic and anticoagulant factor. Cobra venom contains a powerful neurotoxin which causes paralysis of the sympathetic nervous system. Mamba venom is similar, but also contains a factor which causes rapid coagulation of the blood.

It follows that the symptoms of poisoning vary according to the species of snake concerned.

In Rhodesia the numbers of deaths from snake bite are small, for several reasons.

1. Only a small proportion of the snakes are poisonous.
2. Of the poisonous snakes all members are non-aggressive if left alone.
3. Most bitten persons receive a sublethal dose, because they are bitten through clothing, or jump away before a full dose of venom can be injected.
4. Toxic effects from dangerous bites are greatly reduced by first-aid treatment, which is often available; many farmers keep snake-bite outfits ready for use.

General First-Aid Treatment

First-aid treatment is most important; it should be applied without delay.

1. If the snake has been killed or captured, it should be examined to ascertain if it is poisonous—the absence of poison glands and fangs denotes non-venomous species, of which there are many in Rhodesia.

2. If the snake is poisonous, or unknown, and if the bite is situated on a limb (by far the most common site) a tourniquet should be applied (see below) and the fang holes should be opened with a sharp knife in the direction of the muscle fibres. Bleeding should be encouraged, and suction may be applied either by a mechanical suction device, or by mouth over a thin sheet of rubber.

3. If available, Anti-snakebite Serum (such as is supplied by the South African Institute for Medical Research, Johannesburg *) should be administered. The contents of one ampoule (10 cc.) should be injected under the skin (after disinfection) at the site of the bite, and the contents of a second ampoule under the skin or into muscle at some other suitable point. This serum is polyvalent and is prepared by immunizing horses with the venoms of the Cape cobra (*Naja flava*), the puff adder (*Bitis arietans*) and the ringhals (*Hemachatus haemachatus*).[1] It is a solution of refined globulins.

4. If it is known that the bite has been inflicted by a snake of the cobra type (cobra, mamba, ringhals) it is essential to inject the contents of at least 4 ampoules. Children need large doses because the proportion of poison to body weight is high.

5. After the serum has been given, tourniquets should be removed, the wounds should be washed out with a strong solution of potassium permanganate, and a dressing should be applied. *It is important to understand that it is dangerous to rub crystals of permanganate into the wounds, they may cause severe damage to the tissues; the value of this procedure is doubtful, and it cannot be justified. Permanganate solution should never be injected into the tissues as is sometimes advocated.*

The application of a tourniquet is necessary and it should be applied as soon as possible after the bite. The greatest care should be exercised because of the danger of gangrene if it is left on too long. It is essential to maintain the circulation in the limb, and the tourniquet, which to be effective must occlude the arterial circulation, *must therefore be released for 1–2 minutes every 20 minutes.* It should be removed completely after

---

* A snakebite outfit, containing 2 ampoules of serum, a syringe, needles, a lancet, a tourniquet, a sheet of rubber and crystals of potassium permanganate, and instructions for use, is issued by the Institute. Prices may be had on application to the Institute.

Other similar outfits are issued by commercial firms or institutes in other countries, and the sera differ according to the common species of snakes, but the principles of treatment are the same.

[1] Personal communication.

about 1½ hours or after serum has been given. In many cases irreparable damage has been done to a limb as a result of the tourniquet being applied without being released at intervals, very often in treatment of the bite of a harmless snake. I have been compelled, on more than one occasion with African patients, to amputate a limb which had become gangrenous as a result of the application of a tourniquet for the bite of a night adder which would have done very little damage if left alone.

The tourniquet should not be used if some time (an hour or more) has elapsed since the bite was inflicted.

The biting snakes harbour pathogenic micro-organisms in the mouth, and the wounds they inflict often become infected, and require attention from this point of view.

For general treatment, the patient should be kept quiet, and unnecessary movement is contra-indicated. Fluid (water, tea, coffee) may be given, but alcohol is allowed in only small quantities. Artificial respiration may be necessary.

Hospital Treatment

In discussing hospital treatment it will be helpful to take the more common types of venomous snakes individually, and consider more fully their habits, and the symptoms caused by their poisons.

In most cases the patient arriving at hospital for treatment of snake bite has received a non-fatal dose, and has been given first-aid treatment; it is therefore possible to assess the severity of the bite. It is an advantage if the snake has been brought for identification.

There is often a psychological element, induced by a natural fear of snakes, which requires urgent action. The patient's fears should be calmed, and a sedative (such as chloral with potassium bromide, or phenobarbitone) may be administered. Many people who have become apparently quite ill from the bite of a harmless snake respond to reassurance and a sedative. I was recently called to a patient who thought she had been bitten by a snake which ran over her foot. She was alone in the house, and in her agitation she had consumed half a bottle of whisky, which she imagined to be the best cure for snake-bite. When I was summoned by the frantic husband he told me that her feet were numb and that she was quite unable to stand. Hers was a plain case of alcoholic intoxication and nerves.

Hospital treatment therefore depends on:—

(a) the time since the bite;
(b) the severity of symptoms on arrival;
(c) the effect of previous treatment;
(d) the type of snake.

1. *The Night Adder* (*Causus rhombeatus*)

The night adder accounts for most of the cases of snake bite in Africans admitted to hospital. Its bite is usually not very serious, but causes some local swelling and pain, which subsides after treatment for a few days. The bite is almost always on the foot, and occurs at night when the snake, which tends to lie on warm footpaths, is trodden on and bites the unprotected limb.

Treatment consists of soaking the foot every 4 hours in a hot solution of potassium permanganate, and applying glycerin and ichthyol dressings, or other similar dressings. When these cases are seen—usually on the morning after the bite—administration of serum is unnecessary, but 10 cc. of 10 per cent. calcium gluconate should be given intravenously and repeated at intervals of 8 hours. This will relieve pain, and appears to assist recovery

most effectively. The patient always recovers and there appear to be no after-effects.

2. *The Puff Adder* (*Bitis arietans*)

The puff adder causes by far the greatest proportion of serious snake bites and even very small specimens are dangerous; it is often responsible for the loss of a limb or part of a limb, and, no doubt, causes most of the few deaths. Many of the severe bites are inflicted by very young or half-grown snakes, the history being that the patient was moving straw or sticks and felt the bite on the hand, or (as in the case of a few Europeans) was handling the snake, thinking it a blind-worm or a harmless snake. This snake is particularly dangerous because it is naturally sluggish, and is inclined to lie quietly on a footpath, failing to move when approached; it is difficult to see on account of its natural protective colouring, which simulates dappled shade.

The symptoms develop rapidly after the bite. There is pain and swelling of the affected limb, with watery blood oozing continually from the fang-marks and from any local incisions made during first-aid treatment. Pain is severe and, even in comparatively mild bites often spreads rapidly over the whole body. If, as is usual, the extremity of a limb is bitten, oedema rapidly spreads up the limb, and there is marked cyanotic discoloration, and subcutaneous haemorrhages. As a rule, after a few days, the part of the body nearest the bite becomes black and gangrenous, and eventually sloughs off if not amputated.

The damage done by the bite depends on the amount of venom injected. The venom begins to take effect remarkably quickly, but its action is almost over in half an hour, and the swelling and discoloration in the affected area stop or slow down very considerably after that time. It is doubtful if serum administered late after the bite has much beneficial action.

I remember once seeing an African who had received a severe bite on the hand from a puff adder. He had given up all hope and settled himself under a tree to die without taking any treatment whatsoever. I saw him a week after he had been bitten, and the whole of his arm was black and gangrenous. He was persuaded to have the arm amputated and made a good recovery. There appeared to be practically no constitutional disturbance.

Treatment consists of giving 10 to 20 cc. of polyvalent serum if it has not already been given as a first-aid measure. Once the rapid swelling and subcutaneous haemorrhage have become fixed, further doses of serum seem to be of no avail, and neither the eventual gangrene nor the acute pain is relieved by this treatment. In all cases 10 cc. of 10 per cent. calcium gluconate should be given intravenously every 8 hours as this relieves the pain considerably and appears to assist local symptoms. Local treatment consists of applying glycerin and ichthyol or glycerin and eusol dressings to the affected area; hot soaks every four hours help the pain. Analgesics may be given at any time.

In cases of severe bite when necrosis occurs, a line of demarcation appears on the affected limb after a few days and amputation can be performed. The stump usually heals quite well.

3. *The Cobra* (*Naja spp.*)

Unlike the puff adder, the cobra is not a common cause of snake bite in Rhodesia. One of the species most frequently met is the black-necked cobra (*Naja nigricollis*), an active, nervous snake which, at the approach of danger, either makes off as fast as possible, or rears up with open hood

to defend itself, and is easily seen. Dogs are commonly killed by the cobra because they attack it and are bitten. *Naja nigricollis* is one of the spitting cobras; it can eject its venom to a distance of 6 feet, and seems to be able to aim at the eyes of the victim. Most of the casualties occur in this way, the venom causing an extremely painful conjunctivitis, which subsides only after several days, though there are usually no serious after-effects. Occasionally, however, the venom is partially absorbed, and I have seen a case of paralysis of the lower jaw in a dog as a result of venom conjunctivitis.

Venom conjunctivitis should be treated by washing out the eye with milk or a solution of milk and permanganate, and a few drops of antiserum should be instilled into the eye. Pain can be relieved by eye-drops of 10 per cent. cocaine in castor oil. It is wise to inject the remainder of the ampoule of antiserum intramuscularly because of the possibility of absorption of venom, as in the case of the dog mentioned above.

The symptoms of cobra bite develop more slowly than those of puff adder bite, there being comparatively little swelling of the injured limb, but great constitutional disturbance, the victim gradually sinking into unconsciousness and finally becoming cyanosed and collapsed. Death occurs from respiratory and cardiac failure as a result of paralysis of the sympathetic nervous system.

For cobra bite, first-aid treatment is as for other snake bites. Hospital treatment consists essentially of administration of serum repeatedly until recovery takes place. At least 4 ampoules should be administered in the first instance. In a late case, when the patient is becoming unconscious, and when there are signs of respiratory and cardiac failure, the serum should be given intravenously.

Oxygen and respiratory stimulants should be given as the need arises.

I have treated a number of dogs which had been bitten by cobras, and they responded very well to serum; in advanced cases, with unconsciousness and cyanosis, the intravenous administration of 10–20 cc. of serum has brought about complete and remarkable recovery.

It seems unlikely that calcium therapy would be very useful in cobra bite, but as an adjuvant it might relieve pain, and it might counteract serum reactions.

4. *The Mamba* (*Dendraspis angusticeps*)

The bite of the mamba is uncommon in Rhodesia, probably because the snake is rare and of retiring habit. In *Reptiles and Amphibians of Southern Africa*, Walter Rose remarks that " . . . deaths due to Mamba bite are rare. Rhodesia, largely bush country with a native population of two and a half million, is its chief haunt; nevertheless, an official report for 1930, analysing the 350 deaths among natives from violence, gave only 10, or 1 in a quarter of a million, as due to snake bite. This includes mambas, puff adders and cobras, as well as possible tendentious attribution ". It is usual for boomslangs and tree snakes to be mistaken for mambas.

The mamba is apparently quick to bite if disturbed and unable to escape. Its bite is usually rapidly fatal, and the immediate administration of serum would seem to be the only useful treatment. I have never seen a case.

5. *The Boomslang* (*Dispholidus typus*)

Of the back-fanged Colubridae, the boomslang (tree snake) is medically the most important, though it rarely bites, and as its fangs are situated posteriorly its bite is seldom venomous. It seems to bite only when handled indiscriminately. In Northern Rhodesia a boy was bitten recently and it

was evident that the venom contained a very active haemolytic and anti-coagulant factor, which apparently had a much more generalized effect than puff adder venom. Cure was finally obtained only after the use of serum and a great number of blood transfusions.

SUMMARY OF RECENT ABSTRACTS *

IV. TRYPANOSOMIASIS †

African Trypanosomiasis

General: Epidemiology

A collection of papers read in Lisbon at the First National Congress of Tropical Medicine, and dealing with trypanosomiasis, has been published (p. 1230).

The Report of the Colonial Office Tsetse Fly and Trypanosomiasis Committee for the year 1952–53 (p. 542) deals with the East African organization and with the West African organization; reports of these two are referred to below, but this combined report is a useful account of the work done.

The Annual Report for 1953 of the East African Tsetse and Trypanosomiasis Research and Reclamation Organization (p. 1207) contains much information on work done at Shinyanga and Sukulu. It is interesting to note that the Tinde strain of *T. rhodesiense* has not lost its infectivity to man after 18½ years of cyclical passage in sheep. The report should be read in full.

In the annual report of the West African Institute for Trypanosomiasis Research (p. 25) the method of "obstructive clearing" is mentioned, in which trees forming a canopy over streams are felled into the stream-bed, which they block, obstructing the flight of *G. palpalis* and removing overhead insulation from the sun. It is cheap and effective. Studies on the habits of the fly and the value of partial clearing of vegetation round permanent pools are reported, and a serious extension of *G. morsitans* in Northern Nigeria is mentioned. There is a discussion on the epidemiology of the disease in Gambia where incidence is high only in rice cultivators, and in Sierra Leone where *G. palpalis* is widely distributed along rivers and streams. Chemoprophylaxis with pentamidine has been tried, and treatment of animals with Antrycide has been popular. *Trypanosoma vivax* is the most important cattle trypanosome of West Africa; it has with difficulty been established in rats for experimental work.

Early in the present century sleeping sickness spread widely in Nigeria, so that in 10 years from 1931 an incidence of 10·9 per cent. was recorded in the 2¾ million persons examined by the mobile teams. McLetchie (p. 26) shows that the rate was reduced to 1·6 per cent. in the following decade, and describes the methods of diagnosis used (gland puncture and blood examination) and the treatment given (Antrypol and tryparsamide, and later

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* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1954, v. 51. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on trypanosomiasis in this series see the May issues of the *Tropical Diseases Bulletin* each year since 1939.

pentamidine). *G. palpalis* and *G. tachinoides* are the important vectors, and the author traces the development of methods of eradication.

In part of the Northern Territories of the Gold Coast a great reduction in sleeping sickness has been effected since about 1941 by selective clearing against *G. palpalis*. Scott (p. 27) produces evidence which indicates that this reduction has had an important bearing on the reduction observed in Ashanti, 200 miles to the south, to which area large numbers of people travel each year by road. The measures taken in the north have reduced the source of infection for those in Ashanti, and the lowered incidence in Ashanti cannot be attributed to the single mass treatment which was given in 1940–43, and no fly control is attempted there.

In Sierra Leone the first serious outbreak of sleeping sickness to be discovered occurred in 1939, when it spread from French territory into the area of the Kissi tribe, which at the time was in a state of near-famine. This is a zone of transitional vegetation favourable to *G. palpalis*, where man-fly contact is close, and the whole of this zone became involved. Hutchinson (p. 889) shows that although the clinical condition suggested low virulence, the mortality was high, and the disease evolved rapidly and death occurred before the classical symptoms developed. In some parts, however, the disease appeared to be mild. The outbreak was checked in 1944 by mass prophylaxis with pentamidine, but entomological control was not possible; recrudescence could therefore occur. Mass surveys are essential to control. The savanna country of the north and the secondary forest and evergreen thicket of the south are unsuitable for fly, and man-fly contact is not close.

Gillet (p. 1042) has written a general account of trypanosomiasis in the Belgian Congo and Ruanda-Urundi, in connexion with a nosological map to be published later.

Transmission

Two sets of maps of the distribution of tsetse flies have been issued. One is Sheet 3 of the set prepared by the Directorate of Colonial Surveys (p. 680) from information collated by Potts, which includes the whole of Africa south of latitude 5°N., and the other, prepared by Maillot (p. 254), relates to 12 species (with a separate map of the sub-species and varieties of *G. palpalis*) in French Equatorial Africa.

A study of the factors which induce tsetse flies to feed indicated that warmth was a strong stimulus and that it was appreciated by thermo-receptors in the antennae. Dethier (p. 777) shows that salivation took place in response to both favourable and unfavourable stimuli. The repellency of certain substances depended not on contact with the tarsi but on short-range olfactory appreciation located in the antennae.

In a paper on the laboratory maintenance of *Glossina*, Willett (p. 778) shows that *G. swynnertoni* can be maintained, especially if fed on sheep, and that *G. austeni* is likely to be very amenable. *G. morsitans* and *G. pallidipes* soon died out.

A long paper on the biology of reproduction and intra-uterine embryonic development in *G. palpalis* has been published by Hoffmann (p. 1148), who reviews existing knowledge and records his own research. Maillot (p. 1147) discusses the various forms of *G. palpalis*, which he has reduced to 4—*palpalis*, *fuscipes*, *martinii* and *quanzensis*, though *fuscipes* may be regarded as a species rather than a variety of *palpalis*, and *quanzensis* as a sub-species of it. He discusses distribution of these in French Equatorial Africa, and the failure of hybridization except between *fuscipes* and

quanzensis. ROUBAUD (p. 1150) has also failed in attempts to cross-mate *palpalis* and *quanzensis*.

In a study of *G. pallidipes* in Kenya WILSON (p. 780) noted that it preferred riverine areas for breeding during hot periods. After heavy rainfall, when more shade was produced than usual, the flies tended to remain in the open bushland. PARSONS (p. 780) describes his detailed observations on a breeding place of *G. pallidipes* in Kenya, in evergreen shrubs of *Craibia* sp.

Aetiology

REFAAT and BRAY; MAEGRAITH (p. 154) report that the milk diet which suppresses *Plasmodium berghei* infection in rats does not have the same effect in *Trypanosoma rhodesiense* infection. (KEPPIE (p. 33), however, found that diets containing considerable amounts of casein protected mice against *T. congolense*, and she thinks that the reason is that these diets failed to nourish the parasite rather than that the milk contained an antiparasitic agent.)

Diagnosis and Clinical Findings

In studies on the complement-fixation test, VAN GOIDSENHOVEN and SCHOENAERS (p. 357) describe a quick and simple method for collecting and preserving trypanosomes for preparation of antigen, and EVENS *et al.* (p. 357) describe an improved method for obtaining trypanosomes from rats for this purpose, by the injection of ephedrine. This test, with an antigen prepared from *T. equiperdum*, is highly specific for *T. gambiense* infection in man. EVENS *et al.* (p. 543) have examined its value in relapse, finding that it detects 15 per cent. fewer cases during relapse after treatment than when there has been no treatment, but it is more valuable than methods of diagnosis which depend on the finding of trypanosomes. It is less strongly positive during relapse than in untreated cases. Regular performance of the test during treatment would enable relapses to be detected. The test becomes negative after successful treatment.

TRINCÃO *et al.* (p. 891) have made observations on the serum proteins in trypanosomiasis, but although many abnormalities were found there was no definite picture specific for the disease. Certain non-specific reactions for protein, and the colloidal benzoin reaction, tend to be negative with cerebrospinal fluid in the early stages of trypanosomiasis, and positive in later stages (LAPEYSSONNIE, p. 1231).

A case of congenital trypanosomiasis is reported from French Equatorial Africa by CAPPONI (p. 356).

DEBEIR (p. 150) has made a study of ocular disturbances in trypanosomiasis. There is a direct relationship between these disturbances and the lymphocyte count in the cerebrospinal fluid and the general severity of the disease. The changes are almost always bilateral, and blindness may come on suddenly; the prognosis is always grave. Blindness is usually the result of tryparsamide treatment, and not of the disease itself, and when eye complications develop, tryparsamide should be stopped. The author suggests certain lines of treatment.

Treatment

Though suramin and tryparsamide are widely used, there has been interest in pentamidine for treatment of overt disease, and much work on the Friedheim arsenic and antimony preparations.

SCHNEIDER and MONTÉZIN (p. 1044) have found experimentally that the compound of suramin with pentamidine possesses curative and protective

properties at dosage levels below those of its components, and believe that it will be useful in treatment. Similar findings are reported by Cosar *et al.* (p. 892).

Drug resistance has been studied by several authors. The experiments of von Brand *et al.* (p. 29) indicate that arsenic resistance involves a change in permeability of *T. gambiense*, and possibly an alternative metabolic pathway. Williamson (p. 356) has used a method for photometric estimation of dehydrogenase activity which indicates differences in metabolic functions between normal and drug-resistant *T. rhodesiense*. There seems to be a relationship between the acquirement of resistance and the oxidative mechanism. Wagner *et al.* (p. 547) worked with phenylarsenoxides, finding a group specificity in resistance, which was related to acidic or basic, but not neutral, derivatives, and to the electrical charges of the chemicals or the trypanosome surface.

Two patients with early Rhodesian sleeping sickness were successfully treated by Gelfand and Alves (p. 891) with pentamidine isethionate in doses of 200–300 mgm. daily for 10 days; a third was given a shorter course with different dosage. The results were satisfactory, the patients being observed for 1, 6 and 6 months.

T. rhodesiense infection is still a disease of considerable importance in Tanganyika, and in recent years the case mortality has been over one-third. Apted (p. 152) reviews the treatment generally given, and reports success with Mel B (or the French equivalent Arsobal) in cases found incurable by other drugs. He has used intravenous doses as high as 3·6 mgm. per kgm. daily for 4 days, or of 1·8 mgm. per kgm. daily in two courses of 4 days each. He advocates the larger doses in late cases, but in early disease Antrypol [suramin] is the drug of choice.

In Tanganyika (p. 1042) a focus of transmission by *G. palpalis* on Lake Victoria was dealt with by mass prophylaxis with pentamidine, clearing methods having proved unsatisfactory. Reports are given on other foci [not of the type transmitted by *G. palpalis*] and on methods of treatment—Mel B is valuable in advanced cases but is unsuitable for dispensary use; pentamidine isethionate has proved effective in early *T. rhodesiense* cases.

Friedheim (p. 29) reports a case of *T. gambiense* infection which resisted treatment with Antrypol and tryparsamide for several years, until finally cleared up by an intensive course of tryparsamide. A second infection occurred in this patient, which was very virulent and resisted treatment with tryparsamide, Antrypol, pentamidine and Eagle 70A, but was cured by Mel B (which affects a different biochemical system of the parasite). This case indicates that a cured infection does not confer immunity to reinfection, or mitigate the severity of a second infection. Stercкx (p. 153) reports good results with Mel B (Arsobal) in the Belgian Congo. One toxic side effect is arsenical shock, which in some cases resolved rapidly when BAL was given. He discusses other side effects.

Some strains of trypanosomes resistant to Mel B have been found in the French Cameroons, and this resistance may be an inherent character linked with tryparsamide resistance, or may develop as a result of insufficient treatment with a compound containing the same phenylmelaminyl radical as Mel B (Friedheim, p. 151).

MSb and MSbB are melaminyl compounds, and are the antimony analogues of the arsenicals Melarsen and Mel B. Friedheim (p. 544) has used MSb by intramuscular injection (single dose 0·01 gm. per kgm. with a maximum of 0·5 gm.) to a maximum of 5 doses in 7 days, together with MSbB by mouth (single dose up to 0·08 gm. per kgm.) to a maximum of 7 doses in 7 days. He reports good results in first-stage and second-stage

infections with *T. gambiense*. Each compound can cure each stage, but the combination acts more quickly than either alone. The best dosage remains to be worked out by further trial. Toxicity was slight.

Control

A considerable amount of work has been done in East Africa on the application of insecticides from aircraft for the control of tsetse flies. Hocking and Yeo (p. 31) report preliminary trials with sprays and aerosols of DDT and BHC and the estimation of mean diameter of the droplets and of total recovery when the aircraft operated at various levels. Reduction in populations of *G. palpalis* on small islands in Lake Victoria was disappointing, even after 8 applications. The distribution of insecticidal aerosols through woodland is obviously affected by air movement, and Thompson (p. 472) reports studies on the effect of woodland on this movement. He shows that good spread and mixing of smoke could only occur with low outside wind speeds, and that applications from air and ground should both be effective in these conditions, but air application would be hindered by dense canopy and ground applications by very light canopy.

For work against *G. morsitans* and *G. swynnertoni* in Tanganyika Hocking *et al.* (p. 473) used 10 per cent. solutions of DDT or BHC in oil, applied as aerosols produced in aeroplane exhausts. The droplets varied in size from 4 μ to 250 μ (average 90 μ). With 8 applications at intervals of 2 weeks very substantial reductions in the numbers of flies were achieved in two trial blocks of woodland, and the numbers remained low for several months. Certain points of technique could be improved. In *G. swynnertoni* woodland, however, 7 treatments were given at intervals of 2 weeks, in an attempt to create a fly-free corridor along a stock route. At first the spraying was done in the early morning or late afternoon, but since the residual value was doubtful, and it was thought that the flies might avoid the spray in these circumstances, later applications were made throughout the day. Hocking *et al.* (p. 32) report that for 2 months after treatment the area was virtually free from flies, but that the numbers then rose fairly rapidly.

de Azevedo (p. 1043) describes the campaigns undertaken against sleeping sickness in the Portuguese African territories. In Angola much reliance has been placed on pentamidine prophylaxis, with spectacular results, but in Mozambique, which is a *G. morsitans* area, a more complex approach has been made. In a discussion of *T. rhodesiense* infection in Mozambique, the epidemiology of which is still not well understood, Silva (p. 547) concludes that control is best achieved by concentrating the people into large village settlements, as has been done by Maclean and his successors in Tanganyika. The sleeping sickness situation has not changed recently, however, and the annual report of the Trypanosomiasis Commission (p. 1209) shows that the shooting of game for the control of *G. morsitans* in Mozambique continues. It records work on various schedules of treatment of the human disease and on the various problems of animal trypanosomiasis.

Glasgow (p. 30) shows that in an experiment in which *G. palpalis* was attacked by catching on the banks of an East African river, the numbers of non-teneral males and females declined steadily whereas the numbers of teneral flies remained nearly constant because there were many puparia in the soil at the beginning of the experiment. He discusses these results in terms of geometrical progression, taking immigration of flies into account. In Kenya the eradication of *G. palpalis fuscipes* had proved difficult by hand catching, discriminative or total clearing, and the clearing methods were

expensive because regeneration of vegetation had to be checked frequently. Wilson (p. 471) resorted to spraying the vegetation fringing the rivers with 5 per cent. DDT, and found this (at the rate of 15–20 lb. DDT per acre) both effective and cheap. The residual effect lasted 14 days or more in the dry weather but was rapidly lost in the rains.

An account of the fly invasions of Uganda, and of the methods of control used, which have succeeded in reclaiming a vast area of country since 1947, is given by Moggridge (p. 359). The methods varied with the species and the localities, and included the shooting of game, and clearing of bush and thicket which formed the principal foci of fly and harbourages of game. The general policy was to force the fly back to areas where consolidation lines could be established as a protection against re-invasion of reclaimed territory, and these lines take into account natural barriers such as the Nile river and lake system, open country or human cultivation. In the reclaimed areas cattle have been re-introduced successfully.

In Nigeria (p. 891) infection rates are usually under 1 per cent., but a serious outbreak was reported in 1952–53 from Kano. There is still a potential danger in the mining industry, and the labour force is protected by fortnightly examinations and administration of pentamidine twice each year to persons whose homes are in tsetse-infested areas. Much riverine clearing is continued to control *G. palpalis* and *G. tachinoides*, but half of the control staff is engaged with *G. morsitans* in north-east Zaria.

Kumasi is an expanding town in Ashanti, Gold Coast, and the vegetation of the town (which is on hilly ground) is of semi-deciduous rain forest type, with thick secondary bush along the valleys. Discriminative clearing has led to reduction of *G. palpalis*, the cost being up to £25 per acre (Nowosielski-Slepowron, p. 470).

Almost complete eradication of sleeping sickness has been achieved in Oubangui-Chari by the prophylactic use of pentamidine or lomidine; le Gac (p. 358) regards this as the method of choice in dealing with endemic centres in savanna country or forest.

Trypanosomiasis of Animals

T. vivax can be passed to rats if normal sheep serum is also injected, but Desowitz and Watson (p. 155) have succeeded, after 37 such passages, in establishing this line in rats without the injection of sheep serum. Both supplemented and unsupplemented lines became more virulent, and both can still develop in *G. palpalis*. Desowitz (p. 1151) discusses the active component of the plasma supplement, which is protein.

Some activity against experimental *T. congolense* infection is shown by certain thiobiuret derivatives (Woolfe, p. 358).

Cantrell (p. 548) reports a study on the diminished assimilation of ^{32}P by *T. equiperdum* in the rat late in the infection.

Hoare (p. 892) discusses the loss of the kinetoplast in trypanosomes, with special reference to *T. evansi*.

American Trypanosomiasis

Chagas's Disease

Epidemiology

American trypanosomiasis has often been regarded as a disease of rural areas, but Benchimol *et al.* (p. 895) show that with increasing migration to

the towns cases are now met there. They discuss diagnosis, cardiac involvement and electrocardiographic findings.

Torrealba and his colleagues (pp. 156, 781) write of Chagas's disease in Venezuela, where *Rhodnius prolixus* is common and *Didelphys marsupialis* and *Marmosa mitis* have been found infected. They refer to the distribution of triatomids.

By means of complement-fixation tests Unti *et al.* (p. 158) found evidence of infection in about 8 per cent. of people in São Paulo, many of whom lived in heavily infested dwellings; Passalacqua *et al.* (p. 893) found it in 4·1 per cent. and Biancalana *et al.* (p. 894) in up to 21·1 per cent., of prospective blood donors in different endemic areas. A considerable incidence of the disease was disclosed in this way by Manso Soto *et al.* (p. 34) in Argentina. Results in Argentina indicate that this test detects more cases than the other diagnostic methods—thick drop, xenodiagnosis, etc. The incidence is high in Córdoba city and province (Bettinotti *et al.*, pp. 36, 549).

By xenodiagnosis and by complement-fixation tests fairly high rates of infection were found by de Freitas *et al.* (p. 549) in cats and dogs in a township in Brazil, indicating that these animals may be important hosts. Dias (p. 155) gives a list of animal reservoirs in Chile, and notes that in man the incidence of the disease is high.

Transmission

The Reduviid vectors of *T. cruzi* have been studied in various countries.

A coccoid bacterium, which is apparently an essential symbiont probably supplying a constituent (possibly folic acid) without which *T. infestans* cannot develop, is described by Geigy *et al.* (p. 35). An analogy is made with the actinomyces which is essential to *Rhodnius prolixus*.

Pick (p. 157) has studied the crystallization of the oxyhaemoglobin of pigeon blood ingested by triatomids, and also *in vitro*. Such studies might be useful in recognizing the origin of ingested blood.

Ryckman (p. 1045) describes a technique for collecting large quantities of faeces from infected triatomids.

Triatoma infestans is an important vector. In São Paulo it is the most important, though da Silva (p. 1044) gives a list of others which have been incriminated. It is the common vector in Córdoba, Argentina (Bettinotti, p. 549), and in Chile where Dias (p. 155) found 44·4 per cent. infected. Larvae of 3rd and 4th stages of *T. infestans* are capable of fasting for periods up to 340 days (Pellegrino, p. 894).

Corrêa and de Lima (p. 1045) discuss a species of *Rhodnius* found infected in São Paulo.

Although *Rhodnius prolixus* was not found away from houses, Torrealba and Díaz Vázquez (p. 681) have frequently found *Triatoma maculata* (sometimes infected with *T. cruzi*) in fencing and decaying trees. Such sites, therefore, need to be dealt with.

An experiment on *Triatoma picturata* indicated that although not so likely to act as a vector of *T. cruzi* as the more notorious vectors, it is quite capable of doing so (Escobedo and Mazzotti, p. 35).

The vectors of *T. cruzi* in Ecuador are named by León and Castillo de León (p. 894).

Aetiology

A certain amount of work has been reported on *T. cruzi*. An electron microscope study is reported by Meyer and Porter (p. 1152). The slender forms in the blood appear to be young stages—they disappear when a

certain amount of immunity is acquired (Pizzi, p. 157). Wood (p. 550) shows that human sweat tends to immobilize metacyclic forms from the faeces of bugs, and (p. 895) that temperatures of 28°–34·5°C. are more favourable than temperatures of 22°–23°C. for development in *Triatoma protracta*. He (p. 552) has studied development in the muscle of infected mice.

Tang (p. 156) has grown *T. cruzi* in tissue culture, and has observed that its development is from trypanosome to leishmania and back, without an intermediate crithidial stage. He believes that in the mammalian host the trypanosomes may invade new cells *in situ*, without the necessity of entering the blood, as is generally thought.

Enzymes in the culture forms of *T. cruzi* have been studied by Baernstein (p. 360), and Prager (p. 360) shows that cortisone and related substances inhibit the oxygen consumption of cultures.

T. cruzi was found in the faeces, or the dissected hind-gut, of 60 per cent. of adults and 22 per cent. of nymphs, of triatomids in Minas Gerais (Guedes, p. 34).

Diagnosis: Immunity

The Davis complement-fixation test with *T. cruzi* antigen is sufficiently specific to be trusted in differential diagnosis and survey work. Pellegrino and Brener (p. 551) did not find it positive in cases of leishmaniasis. A triple antigen made up of cardiolipin, *T. cruzi* and *Myco. tuberculosis* extract, which is used in complement-fixation tests to exclude syphilis, tuberculosis, leprosy and Chagas's disease in prospective blood donors is described by de Almeida *et al.* (p. 1046).

Pellegrino (p. 895) has devised a simple technique for the precipitin test with a polysaccharide fraction extracted from culture forms of *T. cruzi*.

Rodriguez (p. 551) has adapted the technique of the Nelson treponema immobilization test to *T. cruzi*, finding that the sera of infected animals inhibit the movements of the flagellate. It is a specific reaction, requiring adequate amounts of complement, and its effect is to produce the initial stages of trypanolysis. It is to be investigated in man.

In a study of *T. cruzi* infection and immunity of young and older rats (which showed marked differences in the curve of parasitaemia) Pizzi *et al.* (p. 896) conclude that the immunological mechanism is fundamentally humoral, with secondary phagocytosis of damaged parasites.

Clinical Findings

Serological and electrocardiographic studies of unselected persons have been made in endemic and non-endemic areas of Brazil, and the results indicate that some electrocardiographic abnormalities commonly found in chronic Chagas's disease, and myocardial changes, were relatively common in the endemic areas (Dias *et al.*, p. 361). Electrocardiographic studies are also reported by Péra (p. 551).

The first recorded case of specific orchitis in Chagas's disease is described by Hartz and Toledano (p. 1046).

In experimental *T. cruzi* infection in dogs Goble (p. 896) found that changes in the thyroid gland were common, especially in females.

Treatment

A new antibiotic, Puromycin, has been used in experimental *T. cruzi* infection of mice by Sonntag and Kloetzel (p. 898), who thinks that the results were good enough to warrant a trial in man, but Pizzi *et al.* (p. 897),

though finding that it had some suppressive action in mice, concluded that it was hardly as effective as primaquine. Erythromycin was not effective in 6 cases of Chagas's disease (Torrealba *et al.*, p. 681).

Isopentaquine alone, or (more effectively) when given with quinine, appears to have a curative action in experimental Chagas's disease (Christen and Atías, p. 158).

A furan derivative, Furacin, was found useless in experimental Chagas's disease by Manso Soto and Lopetegui (p. 37).

Control

Of 4 insecticides tested against *T. infestans*, BHC was the best, aldrin and dieldrin had slower action, and DDT was very unsatisfactory (Hack and Romaña, p. 36). In São Paulo, however, where the Machado-Guerreiro reaction indicates widespread infection, the results of house spraying with DDT and BHC have been so good that da Silva (p. 1044) thinks that the infection could be eradicated by their use on a bigger scale. Experimental work on the life cycle of *T. infestans* suggests that a single treatment of houses with BHC each year is insufficient to control it (Perlowagora-Szumlewicz, p. 254).

Infection with *T. rangeli*

Experiments in which *T. rangeli* infection was successfully induced in triatomids other than the usual vector (*Rhodnius prolixus*) indicate that it might be encountered in nature in the absence of *R. prolixus*. Coutinho and Nussenzweig (p. 1047) remark that the ease with which it develops in the body cavity of various bugs affords a method for differentiating it from *T. cruzi*. Torrealba and his colleagues (pp. 156, 781) have found it in *R. prolixus* in Venezuela, and mention cases of human infection.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—*monkeys, other animals, birds.*

Clyde, D. F. & Shute, G. T. **A Technique for the Investigation of Mosquito Feeding Preferences on Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 64–7.

Criticism is made of certain techniques for obtaining data regarding mosquito feeding preferences on different people sleeping in the same hut, because they necessitate the presence in the sleeping room of an observer. In this paper the authors describe a technique for securing the information without the introduction of such an influence. The method utilizes the leucocyte counts of blood from man and from mosquito gut. Thick films of blood meals, mixed with saline and less than $1\frac{1}{2}$–$2\frac{1}{2}$ hours old, are stained by a modification of Walker's technique. Leucocyte comparisons are then made with similar thick films of blood taken directly from the human subjects sleeping in the hut. The thick blood-saline films after drying are

dipped in Walker's stain, a methylene-blue phosphate solution, for 1 second. They are then stained with Giemsa for 15 minutes. The Giemsa stain is mixed with a phosphate buffer solution, 1 drop of stain to each ml. of buffer, to assist both in dehaemoglobinizing the blood and in preserving the form of the leucocytes.

To demonstrate the accuracy of the method unselected comparative counts of white cells in the finger blood of one person, and in the gut of 63 mosquitoes fed upon him, are shown in a table.

In the field [Amani, Tanganyika] the following procedure has been adopted. Thick blood films are taken from each human subject before dusk. The people retire to bed, to be awakened shortly after the optimum feeding time of the mosquito under investigation. The hut is then evacuated and spray catches are made of the recently fed mosquitoes which are immediately dissected. *H. S. Leeson*

See also p. 486, Wallis, **A Study of Oviposition Activity of Mosquitoes.**

Annecke, D. H. S. & Jacobs, A. J. **Daraprim as a Malaria Suppressant.** *East African Med. J.* 1954, Dec., v. 31, No. 12, 543–7.

The work here recorded was carried out among an African population living in kraals scattered along the banks of the Klein Letaba River in Northern Transvaal during the period November 1953 to June 1954, a time of year when transmission is usually active. The previous malaria season had been exceptionally heavy, following abnormal rains which had favoured the breeding of the local vector, *Anopheles gambiae*. No attempt to control malaria had previously been made in the area. The predominant parasite was *Plasmodium falciparum*.

Pyrimethamine in a dosage of 12·5 mgm. once weekly was administered to 52 children aged from 2 to 7 years. Parallel observations were made on a comparison group who received no treatment.

The parasite rates in the treated group fell from 74·1 per cent. in November to nil in April, when the drug was discontinued. It rose again to 20·5 per cent. in May, despite the fact that the density of the insect vector was at that time only 1 to every 10 huts. The gametocyte rate fell from 15 per cent. in November to nil in February, March and April, but had risen to 2·3 per cent. in May. The spleen rate fell from 48·5 per cent. in November to 5 per cent. in February, 4·3 per cent. in March and 5·4 per cent. in April, but rose to 9·1 per cent. in May.

The parasite rate in the untreated group fell from 81·0 per cent. in November to 43·2 per cent. in March. It was 46·0 per cent. in April and 59·5 per cent. in May. The gametocyte rate and the spleen rate in this group showed no significant change during the period of observation.

The authors conclude that *P. falciparum* infection in African children from 2 to 7 years of age was successfully suppressed by giving 12·5 mgm. of pyrimethamine once weekly in an area with low anophelism and therefore with transmission of the parasite presumably on a low level. They note, however, that the rise in parasite rate from zero to 20·5 per cent. 5 weeks after the drug had been discontinued demonstrates that the parasite had not been eradicated, even though chances of reinfection during the experimental period and thereafter were negligible.

[It should be noted that in this experiment only one dosage per month was given under direct observation, the remainder being left to be administered by the children's parents. Under such circumstances it is remarkable that the results were as good as the figures indicate.] *G. Covell*

Sautet, J. Un problème important de la lutte antipaludique: les traitements larvicides entrainent-ils un déplacement des Anophèles? [**Does Larviciding displace Anopheles ? An Important Question in Malaria Control**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 4, 544–9.

The author refers to the main conclusions of a paper by Roubaud and Toumanoff [this *Bulletin*, 1954, v. 51, 1143] and disputes them. They considered that *Anopheles maculipennis*, previously rare in the mountains of Corsica, had migrated into and become common in them following the recent intensive attack to which they had been subject in the plains. The present author agrees that records from the mountains were rare, but this was due to lack of search and reporting and failure to recognize the existence of a widespread exophilic strain. He now gives chapter and verse for mountain records, before the recent campaign in the plains, in every way equalling those made after it by the previous authors. He concludes that *A. maculipennis* is not a newcomer to the mountains; it existed there before in the same proportions but generally escaped notice just as did the exophilic strains in the plains. Its existence in them is a danger to eradication schemes and a general threat which merits prolonged and careful study.

G. Macdonald

Palmquist, E. E. & Aldridge, F. F. **Malaria Control in Iran.** *Pub. Health Rep.* Wash. 1954, Oct., v. 69, No. 10, 976–81, 1 chart, 1 map & 8 figs.

Malaria control in Iran, much stimulated by a WHO group which has now been withdrawn, is a cooperative activity by the Iranian Government and the U.S. Operations Mission to Iran, in which the Institute of Malariology, formed in late 1951, plays a considerable part. Activities were at first under close central direction but have, since 1953, been decentralized except for advisory and training services. Difficulties were encountered but are being overcome and the move is successful, allowing more local participation, greater efficiency and economy, and more flexibility than the original mechanism. Despite extension, malaria remains and extension with more decentralization is planned. The programme is being further strengthened by grant of $350,000 from the United Nations Children's Fund.

G. Macdonald

Fontaine, R. E., Gray, H. F. & Aarons, T. **Malaria Control at Lake Vera, California, in 1952–53.** *Amer. J. Trop. Med. & Hyg.* 1954, Sept., v. 3, No. 5, 789–92.

Survey and control operations were carried out to prevent any recurrence of the malaria epidemic which in 1952 affected a girls' camp [this *Bulletin*, 1954, v. 51, 454]. Two anopheline species, *A. punctipennis* and *A. freeborni*, were found breeding around the lake and were controlled by a combination of marginal clearance, residual insecticides in neighbouring houses in the autumn of 1952, larvicidal attack in the spring and minor measures. Few anophelines survived the attack on winter resting places but nevertheless breeding started again in the spring. Complete control was established during the camping season, but breeding recurred, though only on a small scale, when the attack was discontinued.

[The record is of interest because it ends the story of what may be, for a long time, the last malaria epidemic of the U.S.A.] *G. Macdonald*

Gabaldon, A. & Berti, A. L. **The First Large Area in the Tropical Zone to report Malaria Eradication: North-Central Venezuela.** *Amer. J. Trop. Med. & Hyg.* 1954, Sept., v. 3, No. 5, 793–807, 4 figs. [11 refs.]

The epidemiology of malaria in Venezuela, the mechanism of its control, and progress towards elimination have been previously described [this *Bulletin*, 1950, v. 47, 4; 1951, v. 48, 1078; 1952, v. 49, 1027]. The story is now continued with reference to criteria of malaria eradication proposed by the National Malaria Society and accepted by the WHO Expert Committee on Malaria [*ibid.*, 1954, v. 51, 1028]. For this purpose the country is divided into 5 Areas, of which Area I is the central part of the north. It was affected by severe and often epidemic malaria carried by *Anopheles darlingi*, *A. albimanus* and *A. albitarsis*, and predominantly due to *Plasmodium falciparum*. A concentrated search for active malaria cases, involving the examination each year of 8,000–10,000 blood films from fever cases, children with splenomegaly, and others, demonstrated 147, 38, 26 and 20 positive films in the years 1950 to 1953 [some of the totals in Table 2 appear to be incorrect]. The Area was further subdivided into a central I*a* and a peripheral I*b*, in which the annual numbers of positive films were, respectively, 8, 13, 15, 9 and in the other 139, 25, 9 and 11. All were enquired into in great detail and it was found that all the cases in area I*a* in the last 3 years were immigrants from other areas, and all except 2 of those in the last 2 years in area I*b*. The detailed epidemiological study shows that malaria has been eliminated, by accepted criteria, from area I*a* and is being rapidly eliminated in area I*b*.

In the course of control *A. darlingi* has been eradicated from most of the area, but elimination of malaria is not dependent on this, having occurred also in areas infested by a locally potent vector, *A. albimanus*, which still remains.

G. Macdonald

Volovik, R. A. [**Infection of *Aëdes aegypti* Mosquitoes from Chickens infected with *Plasmodium gallinaceum* (Period of Incubation)**] *Med. Parasit. & Parasitic Dis.* Moscow. 1954, No. 4, 360. [In Russian.]

The author infected 5 chickens in May and 8 chickens in September with an emulsion of mosquitoes infected with sporozoites of *P. gallinaceum*. From the day of infection 10 to 20 *Aëdes aegypti* were fed on infected chickens. Blood-fed mosquitoes were kept in a thermostat at temperatures between 19°C. and 33°C. and relative humidity 77–82 per cent.

On the 12th day after feeding on chickens mosquitoes were dissected for oöcysts. Altogether 1,509 mosquitoes were dissected. It was found that in all cases but one, with daily examination of chickens' blood, parasites were found in blood smears 1–2 days before the day on which the chickens were found to be infective to mosquitoes. In only one case were mosquitoes infected on the day on which parasites were first found in the blood.

The method of infection of mosquitoes for the presence of parasites in the blood is less sensitive than examination of blood smears.

E. Shahgudian

NOTE

In his review of the paper by Ball [this *Bulletin*, 1954, v. 51, 1229] Professor Buxton commented that " there is no recorded case of a successful tissue culture of an insect (adult or larva), if by that we mean something in which it has been demonstrated that cells divide and multiply ".

Dr. W. Trager draws attention to a paper he published in *J. Exper. Med.*, 1935, v. 61, 501, in which he reported success in cultivating cells from the gonads of full-grown female silkworms. This work is obviously relevant to the subject; it was not reviewed in this *Bulletin* at the time of publication as the insect is not of medical importance, but it should be brought to the notice of persons interested in such work.

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed*:—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Colonial Office. **Colonial Research 1953–1954. Tsetse Fly and Trypanosomiasis Committee. Report for 1953–54** [Barnes, W. L. G., Chairman] (pp. 229–43). Cmd. 9303. 278 pp. 1954, Oct. London: H.M. Stationery Office. [7s. 6d.]

The first 2 parts of this report consist respectively of the reports of the East African Tsetse and Trypanosomiasis Research and Reclamation Organization and of the West African Institute for Trypanosomiasis Research. These have already been reviewed separately [this *Bulletin*, 1954, v. 51, 1207; 1955, v. 52, 130].

Part III gives some brief general remarks. It is noted that the 3 sheets of the map of Africa showing distribution of species of tsetse flies have now been published [this *Bulletin*, 1954, v. 51, 680]. Control and clearance measures continue in the individual territories, supported in many cases by contributions from the Colonial Development and Welfare Funds. One scheme mentioned is that intended to make the underpopulated and empty regions of Zaria Province, Northern Nigeria, available for farming to the crowded Mohammedan peoples of Kano and Katsina Province, where population density in some places is as much as 400 per square mile. To meet part of the cost of completing this scheme, a grant of £100,000 was made available in the year under review.

Part IV concerns the Sub-Committee on Game and includes a brief account of the work of the third Inter-African Conference on the Preservation of the Fauna and Flora of Africa, which was held at Bukavu, Belgian Congo, in October 1953. *H. J. O'D. Burke-Gaffney*

Mühlpfordt, H., Lins de Almeida, J., Girala, N. & Andrade Lima, C. Die Wirkung von Paraxin auf die *Trypanosoma gambiense*-Infektion bei Mäusen. [**The Effect of Paraxin on** *T. gambiense* **Infections in Mice**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, Nov., v. 5, No. 4, 442–5.

The English summary appended to the paper is as follows:—

" Paraxin—identical with synthetized chloramphenicol or chloromycetin—was given to mice experimentally infected with *Trypanosoma gambiense*. The drug was dissolved in propylene glycol and orally given. The dosage varied from 1456 to 800 milligrams per kilogram of body weight.

"The life span of paraxin-treated mice was not prolonged as compared to that of control mice, and the course of the trypanosome infection seemed in no way altered."

Olberg, H. Über die Bluteiweissveränderungen bei experimenteller Infektion von Mäusen mit *Trypanosoma brucei*. [**Alteration of Blood Proteins in Mice experimentally infected with** *Trypanosoma brucei*] *Zent. f. Bakt.* I. Abt. Orig. 1955, Jan., v. 162, Nos. 1/2, 120–35, 6 figs. [25 refs.]

The English summary appended to the paper is as follows:—

"The serum protein of mice and guinea-pigs could paper-electrophoretically be separated into 7–10 fractions. Comparable results could be obtained with inbred mice only, because they show less individual variations. The normal blood protein pictures of mice and guinea-pigs differ considerably. The blood sedimentation rate however was the same in both kinds.

"Examinations were performed during an infection with *T. brucei* at different doses of infection in 3 series of tests with inbred mice. The infection led to protein alterations esp. hypalbuminaemia, which, however, are not specific for this disease. The protein alterations at the outset of illness do not cause an increase of the sedimentation rate."

Squire, F. A. **Observations on the Incidence of Trypanosomes in** *Glossina palpalis* **(R.-D.) in Sierra Leone.** *Bull. Entom. Res.* 1954, Dec., v. 45, Pt. 4, 797–801, 1 fig.

The earlier work of this author [see this *Bulletin*, 1952, v. 49, 26] will be remembered. He found that there was a seasonal variation in the incidence of trypanosomes identified as *T. vivax* in *Glossina palpalis* in Sierra Leone, basing his conclusions on dissections carried out over 12 months and dividing his insects into 3 age-groups: of these groups the first, the youngest, seldom showed infection and was rightly excluded from consideration. In this paper he gives the results of fuller experience, dealing with 36 months in all, including those on which the previous paper has reported. The total number of males in age-group 2 slightly exceeded 4,000 and in age-group 3 numbered 1,140: the numbers of females were smaller. It is shown that the infection rate is higher in the third than in the second age-group and in females than males, the differences being significant. One may explain both differences by saying that the rate rises with age, *i.e.*, with opportunities of infection. The author does not hold that it is the first meal alone which is likely to infect the tsetse, which has been demonstrated with trypanosomes of the polymorphic group. As to seasonal incidence, the larger collection of data supports what had already been shown. There is an inverse correlation between mean daily sunshine and the incidence of infection month by month. The correlation coefficient ($-0{\cdot}49$) is statistically significant.

The author now publishes for the first time his findings on members of the *T. congolense* group in his dissections of *G. palpalis*. The series of months and the total number of dissections are nearly but not quite identical with those quoted above. He finds that in age-group 2 the rates of infection are below 1 per cent. and in age-group 3 between 1 and 2 per cent. The total number of positives is small, not sufficient to indicate whether there is a seasonal difference in the rates of infection.

P. A. Buxton

Laranja, Francisco S. Evolución de los conocimientos sobre la cardiopatía de la enfermedad de Chagas. Revisión crítica de la literatura. [**Critical Review of the Literature regarding Present Knowledge of Cardiac Lesions in Chagas's Disease**] Translated by José Francisco Torrealba & Angel Díaz Vázquez. 155 pp., 14 pls. 1954. Caracas: Imprenta Nacional.

This is a Spanish translation by Drs. J. F. Torrealba and A. D. Vazquez of Venezuela, of the review published in Portuguese in 1949 by Dr. F. S. Laranja of the Instituto Oswaldo Cruz in Rio de Janeiro [this *Bulletin*, 1952, v. 49, (382)].

The translators point out in a note that as the translation is intended primarily for medical students in Venezuela, they have included 14 portraits of eminent workers in this field of study.

[The original review brought the literature up to 1948. Since then an immense amount of further work on cardiac involvement in Chagas's disease has been done in South America, adding considerably to the literature, with which readers of this *Bulletin* will be familiar.]

H. J. O'D. Burke-Gaffney

Rubio, Mafalda & Pizzi, T. Acción de la primaquina, pentaquina y pentaquina-quinina, sobre formas sanguíneas virulentas de *Trypanosoma cruzi*. [**Action of Primaquine, Pentaquine and Pentaquine-Quinine on Virulent Blood Stages of** *Trypanosoma cruzi*] *Bol. Chileno de Parasit.* 1954, July–Sept., v. 9, No. 3, 75–9.

The English summary appended to the paper is as follows:—

"The 'in vitro' action of primaquine, pentaquine and an association of pentaquine and quinine on virulent trypanosoma stages of *T. cruzi* was investigated.

"The three drugs were found to have lytic action on the parasites. The highest active dilution was of 0·12 mg./1 ml. for pentaquine-quinine, of 0·25 mg./1 ml. for primaquine and of 1 mg./1 ml. for pentaquine. Parasites were firstly immobilized, appeared vacuolated and the total destruction was completed within 6 hours. Changes of pH and osmotic variations were ruled out as mechanism of action. To check the lytic action, experimental inoculation of mixture of virulent parasites and drugs at different dilutions were made, using inbred mice as susceptible host. This inoculation confirmed the 'in vitro' results.

"Quinine produced 'in vitro' a rapid gelification of the plasma of infected animals, which diagnostic importance is now being investigated."

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Brocard, H., Choffel, C. & Gallouédec, C. Typhus exanthématique survenu chez un Nord-Africain hospitalisé et traité pour tuberculose pulmonaire. [**An Attack of Exanthematic Typhus in a North-African under Treatment in Hospital for Pulmonary Tuberculosis**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1954, Nos. 28/29, 1037–9.

A native of North Africa, aged 23 years, was attacked by louse-borne typhus in May 1953, while under treatment for pulmonary tuberculosis. The diagnosis was based on a positive rickettsia-agglutination reaction with *Rickettsia prowazeki* and on a prompt response to treatment with chloramphenicol. Recent infection could be excluded with a reasonable degree of certainty and the conclusion reached was that latent infection may have persisted since 1941–42 when the patient was living in Algiers during a severe epidemic of typhus fever, so that he was likely to have suffered from an inapparent attack of the disease. The author thought that the recent lighting-up of the infection may have been due to therapeutic shock caused by intravenous injections of PAS with which he was being treated in hospital. In the discussion which followed the reading of the paper, Dr. Paraf stated that he had seen an analogous case in a North-African patient who also was being treated with PAS and who had not recently been exposed to infection. *John W. D. Megaw*

Suyemoto, W., Scanlon, J. E. & Sicay, T. C. **Ectoparasite Fauna of Small Mammals and Birds in the Fuji Maneuver Area, Honshu, Japan.** *J. Parasitology.* 1954, Dec., v. 40, No. 6, 632–7. [10 refs.]

" Sixteen species of chiggers, belonging to 4 genera, are known to occur in the Fuji military maneuver area. On the basis of seasonal occurrence 2 of these species, namely *Trombicula pallida* and *T. scutellaris*, qualify as possible vectors during the 1948 outbreak of scrub typhus in this area. Chiggers were scarce, both in number of species and individuals, during the summer months, as shown by surveys in 1952 and 1953, and did not become abundant until late September. No significant distribution pattern is detected from the chiggers in the Fuji maneuver area with the exception of *Trombicula nagayoi* which occurs at relatively high elevation. Protection from the hazards of chigger-borne diseases depends upon use of clothing impregnated with acaricides and avoidance of intimate contact with the ground in infested areas. Chiggers are the only ectoparasites collected during the series of survey trips which may be considered to be medically important."

BARTONELLOSIS

Manrique V., V. Verruga peruana. Los lípidos totales. Su determinación por método sencillo y rápido. Comparación con otras determinaciones. [**Determination of Total Lipoids in Verruga Peruana by a Simple and Rapid Method. Comparison with Other Determinations**] *Actualid. Méd. Peru.* 1952, July–Aug., v. 18, Nos. 3/4, 27–36. [26 refs.]

The following is a translation of the author's summary:—

The following results have been obtained in 15 cases of Carrion's disease:

(a) The level of total lipoids was low.

(b) This level remained low.

(c) Flocculation reactions were positive except in severe cases when they were weakly positive. They continued positive for some time and paralleled the low levels of total lipoids. They became progressively negative later.

(d) The gamma globulins were raised and remained high in parallel with the low level of total lipoids and the positive state of the flocculation reactions. *H. J. O'D. Burke-Gaffney*

DENGUE AND ALLIED FEVERS

ROBINSON, M. C. **An Epidemic of Virus Disease in Southern Province, Tanganyika Territory, in 1952–53. I. Clinical Features.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 28–32, 1 fig. [12 refs.]

LUMSDEN, W. H. R. **II. General Description and Epidemiology.** *Ibid.*, 33–57, 5 figs.

This is a very interesting description of an epidemic of a disease which is variously described in the two papers as a virus disease, a disease clinically indistinguishable from dengue, a dengue-like fever and dengue. The clear description of the clinical and epidemiological features of the epidemic is consistent in every respect with the diagnosis of dengue and these characteristics, taken together, do not conform to those of any other known disease so that Dr. Robinson seems to be fully justified in calling the group of 10 temperature charts illustrating her paper by the name "representative cases of dengue".

The present epidemic first attracted attention in the form of explosive outbreaks in several villages in October 1952; enquiries showed that a few villages had been affected previously. The infection spread rapidly and usually involved 60–80 per cent. of the people of each village within 2–3 weeks. Among 115 patients observed in hospital the onset was sudden with a rapid rise of temperature to 102°–105°F.; the fever lasted 1–6 days and in most cases, after a period of apyrexia lasting 1–3 days, there was a second rise of temperature to 99°–101°F., lasting 1–2 days and accompanied by a maculo-papular rash in about 80 per cent. of the patients. The second rise of temperature was not constant and was less frequently seen towards the end of the epidemic. From the onset there were very severe pains in the joints, which, however, were swollen in only 6 patients. Headache was usual, but was far less severe than the joint pains which in most cases recurred at intervals after defervescence during periods which sometimes lasted as long as 4 months. Leucopenia with relative lymphocytosia was usual. The pulse rate was proportional to the height of the fever at the onset and in some cases there was bradycardia during the secondary fever. None of the patients died.

The second paper contains a very detailed description of the epidemiology of the outbreak. The area chiefly affected was a plateau lying near the sea coast of the south of Tanganyika and measuring about 45 miles from north to south and from east to west. The altitude ranges from 1,800 to 2,300 feet. The mean rainfall is about 37·3 inches yearly; the rainy season is almost entirely restricted to the months November to May. In 1952 there was an exceptionally high rainfall of 47·3 inches. The mean daily temperature is 71·2°F. in June and it rises to 83·2°F. in November. The soil is sandy, so that there is practically no standing water, and a large proportion of the people live more than 5 miles from the nearest permanent supply. Water for domestic purposes is usually kept in large jars inside the huts. No epidemic of dengue-like fever has been recorded in the annual reports which are available since 1930, and no evidence of the previous occurrence of such a disease could be obtained. In October the number of localities affected was 10; by the end of November it had risen to 35; in December and January it was between 43 and 49; in February it fell to about 30 and by the middle of March the epidemic was practically at an end.

From enquiries made in 305 huts inhabited by 624 adults and 744 children in 13 different localities it was found that 47·6 per cent. of the adults and

53·3 per cent. of the children were attacked. In the huts the average catch of the only common mosquitoes found was 5·2 for *Aëdes aegypti* and 5·5 for *Culex fatigans*. A significant point was that *A. aegypti* had the habit of biting persons sitting in the verandahs by day as well as by night, a factor which must have been responsible for the infection of many visitors and the rapid spread of infection from village to village.

In the lowland areas adjoining the plateau there were far fewer cases, and males over 45 years of age were less frequently attacked than females or children. This circumstance suggested that there may have been a previous epidemic of the disease in which males were specially attacked.

A virus was isolated from all the species of mosquitoes collected in the infected huts and "possibly also" from bed-bugs. The method employed was intracerebral inoculation of mice with the triturated bodies of the arthropods. All the findings pointed strongly to *A. aegypti* as the probable vector. A special paper on the isolation of the virus is promised.

John W. D. Megaw

RABIES

Ramon, G. Considérations sur le mode d'action du virus-vaccin pastorien contre la rage et sur le mécanisme de l'immunité antirabique. [**Observations on the Mode of Action of Pasteurian Virus Vaccine against Rabies and on the Mechanism of Antirabies Immunity**] *Rev. d'Immunologie*. 1954, v. 18, Nos. 5/6, 305–21. [Refs. in footnotes.]

Pasteur in 1885 recognized that the drying of rabies-infected cords did not result in a diminution of virulence proportional to the length of time during which the cords were kept, but in a progressive decline in the amount of living, fully virulent rabies "organisms" (virus), *i.e.*, in a reduction in the quantity but not in the quality of the infective particles. This led him to enquire into the possible mode of action of the vaccine prepared from cords so treated. His view was that in the vaccine there were two essential constituents: one, the living virus, retaining its original virulence intact and capable of multiplying in the nervous system; the other, a "vaccinal substance", contained perhaps in the dead virus particles, and possessing the power, when present in suitable proportion, of inhibiting the development of the former. He foresaw that, if by the use of vaccine material, from which all trace of virulence had been removed and in which, therefore, only the "vaccinal substance" was operative, a state refractory to rabies could be induced in the vaccinated subject, an advance of major importance would have been made. This advance was later achieved when the results of research on the action of various chemical substances on rabies virus had been evaluated. Thus, vaccines prepared from brain tissue in which the virus had been inactivated by, for instance, phenol (Fermi, 1908; Semple, 1911; Puntoni, 1921) or by formol (Plantureux, 1926) proved to be efficacious, not only in the treatment of man after exposure to infection from rabid animal bites, but also in the prophylactic treatment of animals.

As regards the mechanism of the immunity conferred by antirabies vaccination, the author considers that the essential rôle is played by antibodies, "anti-virus", and that the immunity is, therefore, humoral and general, and not, as it has often been regarded, cellular and local, bound up

only with the tissue defence of the neural axis itself. In his view, anti-rabies vaccines of whatever type occasion in the vaccinated individual the formation of specific antibodies capable of neutralizing the virus before it reaches the nerve centres *via* the peripheral nerves, just as tetanus anti-toxin, evoked by toxoid, neutralizes the toxin elaborated by the tetanus bacillus at the site of injury before that toxin attacks the peripheral nerves and proceeds to the intoxication of the central nervous system.

Finally, to the problem originally set by PASTEUR: why among a group of dogs inoculated subcutaneously with very large doses of rabies-infected brain material do a number fail to develop rabies and later acquire a high degree of immunity? the author suggests the following solution. The rabies virus, whether " street " or " fixed ", so inoculated, is incorporated by natural means in the fatty substances of the brain. This fatty mass, containing the virus, gives rise to an inflammatory reaction in the sub-cutaneous tissues which not only retards the diffusion of the virus elements from their site of entry, but also attenuates and destroys them, in short, inactivates them, without, however, diminishing in any way their immunizing properties. These inactivated virus elements constitute, in the author's opinion, the " vaccinal substance " of PASTEUR—a substance, which is absorbed into the circulation and carried to those organs, where it effects the production of antibodies and thereby the establishment of anti-rabies immunity. In like manner, tetanus toxin, when artificially enveloped in lanoline, is rendered anatoxic under the influence of a similar inflamma-tory reaction—an alteration which leads to the production of antitoxin in quantity and the establishment of antitetanic immunity. *G. Stuart*

REMLINGER, P. Les principaux problèmes de la vaccination antirabique. [**The Main Problems of Antirabies Vaccination**] *Rev. d'Immunologie.* 1954, v. 18, Nos. 5/6, 322–38. [Refs. in footnotes.]

In recent years the value of Pasteurian treatment in any of its currently accepted forms has been increasingly called in question. Thus, it is held that persons who have suffered severe exposure and experienced the consequent short incubation period of the disease are not protected; more-over, treatment is fraught with real hazard in the form of demyelinating reactions in the central nervous system which cause paralysis and even death.

In the present article the author examines these criticisms, and comments on new immunizing procedures aimed at achieving a higher degree of protection and a greater freedom from risk. In his view there has been a tendency to exaggerate the number of " failures of treatment " and of paralytic accidents alike. " Failures " should be strictly limited to cases of rabies which occur more than 15 days after the completion of an uninter-rupted course of treatment and, on this basis and with the vaccinating strain rigorously controlled, should not exceed 1 per 2,000 to 3,000 persons treated. After passing in review all methods of treatment now practised, he is convinced of the great superiority of phenolized vaccines, because of their efficiency, ease and low cost of production and application, and the relative infrequence (1 in 2,000 to 2,500 persons treated) of paralytic accidents following their use, and because they permit of that decentraliza-tion which is so essential, if everywhere delay in commencing treatment is to be avoided. The more recently developed vaccines have not yet sufficiently stood the test of time and experience to enable adequate assess-ment of their value to be made. The use of vaccines, from which attempts

have been made to remove the so-called paralysis-provoking factor (regarded as some tissue-specific component of the nervous tissue contained in the vaccine) by means of, for instance, benzene extraction, has given but equivocal results, while the use of a viral antigen not primarily derived from nervous tissue, such as the Flury chicken-embryo vaccine, has not proved to be entirely free from risk in animal protection.

The use of hyperimmune antirabies serum in conjunction with vaccine is questioned on the ground that the former may, because of its antibody content, interfere with the immunizing capacity of the vaccine's antigen. As to the suggestion, based on experimental evidence, that the immediate infiltration of the tissue beneath the wound inflicted by a rabid animal may be employed as a local prophylactic measure, the author points to the difficulty of applying so painful a measure to the hands or face, that is, to the sites where obviously it would be most indicated. He mentions also the irregularity of the results obtained from the application of soap solution, followed by nitric acid, in the local treatment of wounds. The author deals also with the mass vaccination of dogs as a measure of rabies control; he notes the claims made on behalf of chicken-embryo vaccine (Flury strain) in this respect, but considers further proof of its efficacy to be necessary before a final opinion can be given.

[With respect to the use of hyperimmune serum combined with vaccine it is stated in the Second Report of the WHO Expert Committee on Rabies (this *Bulletin*, 1955, v. 52, 149) that results of co-ordinated serum-virus neutralization tests on non-exposed persons receiving antirabies hyperimmune serum and varying doses of vaccines showed: (1) in no instance did the administration of either chicken-embryo or phenolized vaccine after a dose of hyperimmune serum affect the demonstration of the passive antibody due to the hyperimmune serum; and (2) the active antibody response to a course of phenolized vaccine occurring from the 14th day onwards was not affected by the early presence of passive antibody resulting from a dose of hyperimmune serum.] *G. Stuart*

Nagano, Y., Shibuki, M., Kitamoto, O. & Otani, S. Vaccination antirabique par le vaccin irradié. [**Antirabies Vaccination by Irradiated Vaccine**] *Rev. d'Immunologie.* 1954, v. 18, Nos. 5/6, 339–43.

The vaccine under consideration in this article was prepared from a 10 per cent. emulsion of guineapig brain infected with fixed virus rabies, the emulsion having been irradiated for 30 seconds by ultraviolet energy. In a dilution of 1 in 30 the vaccine protected mice against at least 10^3 LD50. For the treatment of man, daily injections were administered over a period of 15 consecutive days, each person receiving on each day 1·0 ml. subcutaneously and 0·2 ml. intradermally. Among 4,000 cases so treated, only those in which the following conditions had been satisfied were included in the authors' statistical evaluation of treatment: proof of rabies in the biting animal; non-intervention of clothing; commencement of treatment within one week of the date of biting. These conditions were fulfilled in the case of 337 persons bitten by rabid dogs. Of these 15 had been bitten in the head, 217 in the upper extremity and 105 in the lower extremity. In none of these did death from rabies occur.

In contrast, of 460 bitten persons, who had been treated by the Pasteurian method, 65 bitten in the head provided 7 deaths, 259 bitten in the upper extremity 9 deaths, and 136 bitten in the lower extremity 4 deaths, *i.e.*, percentage mortality figures of 10·8, 3·5 and 3·0, respectively.

As regards the incidence of post-vaccinal complications: among 838 persons treated with the irradiated vaccine, 2 (0·238 per cent.) developed paralytic accidents; among 6,367 treated by the Pasteurian method, 36 (0·565 per cent.) developed such accidents. *G. Stuart*

Męcińska, Janina. Próby nad odczynem wiązania dopełniacza i hemaglutynacji przy wściekliźnie. [**Studies on Complement-Fixation and Haemagglutination Tests in Rabies**] *Ann. Univ. Mariae Curie-Skłodowska.* Lublin. Sect. DD. 1952, v. 7, 169–88. [17 refs.] English summary.

Sera from 10 rabbits immunized against rabies by repeated subcutaneous injections of Semple vaccine over a period of 3 months were examined for the presence of complement-fixing antibody against an antigen consisting of a saline extract of infected mouse brain treated by repeated freezing and thawing and low-speed centrifugation; 6 sera contained antibody in titres up to 10. The mouse-brain antigen agglutinated horse, bovine, rabbit and sheep red cells at room temperature to a titre of 16; no agglutination was produced by control antigen prepared from normal mouse brain.

D. J. Bauer

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Özsan, K. & Akyay, N. 1947 Veba salgininin epidemiyolojisi üzerinde bazi araştirmalar. [**Epidemiological Studies of the Plague Epidemic in Akçakale in 1947**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1954, v. 14, No. 2, 285–7. French summary.

This is a belated report of an epidemiological study of an outbreak of plague in Akçakale, Turkey, in 1947 [this *Bulletin*, 1948, v. 45, 426]. The strains previously isolated in the Turkish coastal area were different in some biochemical characters from the Akçakale strain, which corresponded with Devignat's third variety, namely the glycerin positive, NO_2 negative form [*ibid.*, 1953, v. 50, 110].

Local studies of wild rodents (gerbils and jerboas) were negative, but the number examined was not great.

The epidemic began in January and not in March as had been believed. The first case was in a boy of 10 who died in 5 days. He had been attending sheep and was accustomed to sleep in the fields. It is suggested that he was infected by fleas from wild rodents. There is proved contact between the local inhabitants and the wild rodents, and some people eat these animals. The need for a larger survey of wild rodents is stressed. The rodent fauna of this region is similar to that in the plague areas of Iran and it is therefore likely that the reservoir is a species of *Meriones*.

H. J. O'D. Burke-Gaffney

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Olitzki, A. L. **Reviews of Infectious Diseases in Israel and the Near East—Asiatic Cholera.** *Acta Med. Orientalia.* 1954, Sept.–Oct., v. 13, Nos. 9/10, 151–63.

A general historical and epidemiological review.

Yajnik, B. S. & Prasad, B. G. **A Note on Vibrios isolated in Kumbh Fair, Allahabad, 1954.** *Indian Med. Gaz.* 1954, June, v. 89, No. 6, 341–9. [21 refs.]

During the Kumbh Fair at Allahabad in 1954 (though no cases of cholera occurred, and the State, which was free from cholera before the beginning of the fair in January, remained free for several weeks after the end of the fair in February), 339 cases of acute gastro-enteritis, of which 9 were fatal, were admitted to the Sardar Patel Hospital for Infectious Diseases, and to 5 temporary hospitals. The disease was mild and of short duration, 95 per cent. of the patients being discharged within 4 days of admission. The cases were scattered all over the fair area and no secondary, or multiple cases, were reported. Anti-cholera inoculation was made compulsory, and enforced at this fair for the first time in 1954, and the general sanitary conditions at the fair appear to have been good.

The authors have investigated the relationship of vibrios isolated from the river water and from patients, to this outbreak. Eighty-five samples of water from the rivers Ganga and Yamuna, and their confluence, were examined for the presence of vibrios. Ten cc. of 10 per cent. peptone water (*p*H 8·0) were added to 90 cc. of the sample which was then incubated at 37°C. for 18 hours. A loopful of the surface film was then plated on bile salt agar (*p*H 8·4) and any vibrio-like colonies were tested with cholera agglutinating serum containing Inaba and Ogawa "O" agglutinins, and with monospecific Inaba and Ogawa sera. No agglutinable vibrios could be isolated, but non-agglutinable vibrios were isolated from 23·5 per cent. of the samples. There was no relationship between the bathing days and the presence of vibrios in the rivers. From 140 cases of gastro-enteritis admitted to the 6 hospitals, 144 samples of faeces and one of vomit were examined for vibrios. Samples received in buffered saline (*p*H 9·2) were tested by inoculating 2 loopfuls into 10 cc. of 1 per cent. of peptone water and incubating for 6–8 hours. A loopful of the surface film was then plated on bile salt agar. Samples received in peptone water were incubated for 6–8 hours, and a loopful of the surface film was plated. No true cholera vibrios could be isolated but 53 samples (36·1 per cent.) showed non-agglutinating vibrios.

The main bathing days were January 14th, when 800,000 bathed, February 3rd with 5 million bathers, and February 8th with 1 million. The first case showing non-agglutinable vibrios was found on 17th January three days after the first bathing day. On 5th and 6th February, within three days of the main bathing day, 58 per cent. [23] of 40 stools examined were positive, and on 9th and 10th February within 48 hours of the third

bathing day, 74 per cent. [15] of 21 samples contained non-agglutinable vibrios.

As the laboratory was established only to confirm bacteriologically the diagnosis of cholera in suspected cases, and was not equipped for the general examination of faecal specimens, no tests for the presence of *Salmonella*, *Shigella*, staphylococci, or other organisms known to cause gastro-enteritis were carried out.

In a long discussion the authors consider the rôle which may be played by non-agglutinable vibrios in causing disease resembling cholera, and the possibility that non-agglutinating vibrios may change to the agglutinable form and give rise to a typical outbreak of cholera. They conclude that the vibrios isolated by them may have been responsible for the outbreak and that such cholera-like outbreaks should be treated as cholera for preventive purposes. *C. C. B. Gilmour*

Abraham, K. C. **The Viability of** *Vibrio cholerae* **in the Clam** (*Meretrix casta*). *Indian J. Med. Res.* 1954, Oct., v. 42, No. 4, 491–6, 1 fig. [18 refs.]

The clam, *Meretrix casta*, occurs abundantly in the estuaries of the east coast of India and there are dense and extensive beds in the Adyar estuary, on the outskirts of the city of Madras, where they are fished intensively. It has been observed that cholera occurs among the fishermen engaged in this industry and the possibility that these clams form a reservoir of cholera vibrios is the subject of this paper.

A sample of clams from Adyar consisting on the average of 12 clams, was analysed bacteriologically once a month from August 1951 to July 1952. During this period the largest number of cases of cholera reported in the City in any one month was 536, with 68 deaths, in September 1951 and the smallest number was in July 1952 when there were 12 cases with 1 death.

The samples were examined by the methods recommended by the American Public Health Association and in addition the pooled material of the sample was enriched in peptone water and plated for the presence of vibrios. No agglutinable vibrios could be isolated, but non-agglutinating vibrios were found, along with *Aerobacter*, *Pseudomonas*, *Proteus*, *Bacillus subtilis*, and *Bact. alkaligenes*. The clam meat had a higher coliform count than the surrounding water and fell far below British and American standards of purity.

The viability of *Vibrio cholerae* in the clam was tested by feeding and inoculation experiments, 6 clams being used for each experiment. An 8-hour culture of *V. cholerae* in peptone water was centrifuged and re-suspended in 2 cc. of normal saline. This suspension was added to water in which the clams were left for half an hour. In the inoculation experiments 0·05 to 0·1 cc. of the suspension, which corresponded to Brown's opacity tube No. 10, was injected into the foot of the clam. After both these procedures the clams were washed in running water, rinsed in alcohol and the alcohol burnt off. They were then placed in a vessel of water of the same salinity as the brackish water of the estuary, the depth of the water being kept constant by a constant-level siphon arrangement. The outflowing water was examined for the presence of vibrios and one clam was removed and examined every 24 hours. As the clams could not be kept alive and healthy for more than 3 or 4 days with this procedure an apparatus was devised to filter and recirculate the water after adsorption and aeration. A figure of this apparatus is given. In this apparatus the clams could be

kept alive for 2 weeks. Peptone water (2 per cent.) was added to the circulating water to study its effect on the survival of the vibrio, and the growth of *Pseudomonas pyocyanea*, which interfered with the isolation of the vibrio, was suppressed by the addition of boric acid to a strength of 0·31 per cent. This reduced the *p*H only to 7·1–7·2.

The results showed that the clams can ingest *V. cholerae* and that it can survive in the clam for 3 days, but counts of the colonies on successive days gave no evidence that the vibrio multiplied, as the number of colonies fell gradually from the first day until after the third day there was none. The longest period for which the vibrios survived in the water was 96 hours. The addition of 2 per cent. peptone had no effect on the survival period of the vibrios. Comparison of the agglutination and biochemical reactions of the strains recovered showed them to be in no way different from the original.

Since *V. cholerae* can survive in clams for 3 days it is possible that they can transmit cholera if eaten raw, a practice not common in Madras, but, as it does not survive for long periods and does not multiply in the clam, it is improbable that these shell fish play any part in maintaining endemic cholera. Judged by their coliform index, however, they must be regarded as unsafe. *C. C. B. Gilmour*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Neghme, A. Estado actual de nuestros conocimientos sobre amebiasis en Chile. [**Present Knowledge of the Incidence of Amoebiasis in Chile**] *Semana Méd.* 60th anniversary 1894–1954, 63–8. [35 refs.]

The author refers at some length to previous studies on amoebiasis in Chile and to various investigations carried out by himself and his colleagues during the last 20 years, with which readers of this *Bulletin* will be familiar.

He now reports a survey carried out on a sample of the population of rural and suburban areas throughout Chile as a whole. The area was divided into 3 Zones, North, Central and South, and altogether 14,992 persons were examined between 1949 and 1952. The incidence of *E. histolytica*, *E. coli* and *Endolimax nana* was highest in the Central Zone, being 23·8, 82 and 31 per cent. The figures for the North and South Zones respectively were 14, 58, 22 and 11, 58, 19 per cent. The average percentages were 17, 69 and 25 per cent. Infection was commonest in those between 7 and 30 years. In schoolchildren in the suburbs of Santiago, the infection rate was found to be 25·5 per cent. of 4,133 examined.

The high incidence in young children is discussed and is believed to be bound up with familial infection, especially as these infections are often traceable to those who prepare the food. In other areas, contamination of vegetables in the soil would favour transmission. The need for repeated stool examinations at intervals is stressed. *H. J. O'D. Burke-Gaffney*

Simitch, T., Petrovitch, Z. & Chibalitch, D. La vitalité des kystes de *Entamoeba dysenteriae* en dehors de l'organisme de l'hôte. [**Viability of Cysts of *Entamoeba histolytica* outside the Host**] *Arch. Inst. Pasteur d'Algérie.* 1954, Sept., v. 32, No. 3, 223–31. [14 refs.]

After reviewing previous observations on the viability of cysts of *Entamoeba histolytica in vitro* and pointing out the discrepancies in the results obtained, the authors conclude that the disagreement is due to differences in the methods employed.

The present investigation of this subject was carried out with 3 strains obtained from Belgrade children. In one set of experiments the stools, harbouring cysts of *E. histolytica*, were divided into 3 batches: one was diluted in distilled water, another in saline, while the last was undiluted. Samples of each batch were kept at various temperatures in the refrigerator and incubators and their viability under these conditions was assessed by daily cultivation of samples in Löffler-serum diphasic medium. In another set of experiments the cysts in faecal specimens were spread on slides and exposed to temperatures from 25°C. to 45°C. for different periods of time, after which the smears were flushed with saline and the washings inoculated into the same culture medium. In a 3rd series of experiments the viability of the cysts was tested by inoculating them in the culture medium and exposing the tubes to temperatures from 41°C. to 50°C., in water-baths.

The results of all the experiments were assessed by examination of cultures 48 hours after inoculation and the viability of the cysts in days was as follows (temperatures in centigrade):

	0° to 6°	2° to 6°	25°	37°	41°	43°	45°	47°	48°	49°	50°
Undiluted	1–4	20–40	3–4	1–2							
Distilled water	1–3	20–40	3–4	1							
Saline	1–3	31–63	2–6	1–2	12 hrs.	3 hrs.	2 hrs.	25 mins.	15 mins.	7 mins.	5 mins.
Smear preparations			10–12 hrs.	3–4 hrs.	1 hr.	15 mins.	5 mins.				

It is concluded that, in general, temperatures between +2° and +6°C. are the most favourable for the preservation of cysts outside the human body, for they remain viable over 40 days even in undiluted stools.

C. A. Hoare

Baernstein, H. D., Rees, C. W. & Reardon, Lucy V. **Symbiosis in Cultures of *Endamoeba histolytica* and Single Species of Bacteria.** *Amer. J. Trop. Med. & Hyg.* 1954, Sept., v. 3, No. 5, 839–48, 3 figs. [11 refs.]

In connexion with earlier experiments directed to obtaining information on the metabolism of *E. histolytica*, it has been shown by the authors that the amount of carbon dioxide produced in culture by the above organism in combination with a single species of bacterium was greater than that produced by the bacteria alone. The amount formed could not be explained on the basis of glucose disappearing from the liquid overlay in the culture medium, which may have been replenished by diffusion from the solid portion of medium or from hydrolysis of starch present by a substance such as amylase. Moreover, Hallman and DeLamater [this *Bulletin*, 1953, v. 50, 936] reported the presence of a diffusible amylase in cultures of *E. histolytica*. The present authors have also shown that this enzyme is present in *E. histolytica* by making an " acetone powder " from amoebae deposited from a suspension in acetone by centrifugation followed by

extraction at different *p*H values. The relationship between glucose and allied substrates used, and of CO_2 and lactate produced, has been further investigated. The authors think it unlikely that the substrates providing material for conversion to CO_2 were protein or fat. In view of the presence in culture of an active amylase derived from amoebae it appeared that starch, which is invariably added, would provide the substrate from which the excess CO_2 finally arose. The complications involved in these measurements when more than one organism was present are emphasized.

J. D. Fulton

Biel, F., Schiappacasse, E., Cabrera, M. & Rabah, A. Imágenes endoscópicas de la rectosigmoiditis amebiana. [**Endoscopic Findings in Amoebic Rectosigmoiditis**] *An. Med. Concepción.* 1954, June, v. 11, Nos. 1/2, 56–60, 5 figs. [12 refs.]

The English summary appended to the paper is as follows:—

"1. 54 patients with intestinal amebiasis are studied, and the endoscopic image, parasitological examination and clinical symptomatology are compared.

"2. The congestive-granular petechial image is discussed and it is considered as the most frequent in the non dysenteric amebiasis.

"3. The ulcerous form is considered as accompanying of the amebiasis with dysenteric syndrome.

"4. The need for practising the immediate study of rectal smear in every rectosigmoidoscopy that is abnormal is emphasized."

Colonnello, F. Orientamenti di patogenesi e di terapia dell'amebiasi. [**Pathogenesis and Treatment of Amoebiasis**] *Acta Med. Italica.* 1954, May, v. 9, No. 5, 113–16. English summary.

Urso, B. & Mastrandrea, G. Progressi nella terapia dell'amebiasi. Contributo clinico. [**Progress in the Treatment of Amoebiasis**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Dec., v. 35, No. 12, 609–14. [15 refs.]

The English summary appended to the paper is as follows:—

"The authors summarize the new therapeutic treatments for amoebiasis and state that chloroquine alone or associated with iodohydroxyquinoline and acridine derivated has given the best results."

Schiappacasse, E., Biel, F., Darricarrere, R. & Rabah, A. Tetraciclina (acromicina) en el tratamiento de la amibiasis intestinal. [**Tetracycline (Achromycin) in the Treatment of Intestinal Amebiasis**] *Bol. Chileno de Parasit.* 1954, July–Sept., v. 9, No. 3, 84–8, 1 graph. [11 refs.]

The English summary appended to the paper is as follows:—

"A report is given of eight cases of intestinal amebiasis treated with tetracycline. In seven of them, the disappearance of the parasite in the stool was obtained immediately after completing the treatment. In four of the eight patients, mild signs of intolerance were observed."

McConnachie, Elspeth W. **The Influence of Environmental Factors on the Size of the Cysts of *Entamoeba invadens* Rodhain, 1934.** *Parasitology.* 1954, Nov., v. 44, Nos. 3/4, 342–8, 3 figs. [15 refs.]

The author has compared the size of cysts in two sub-strains derived from the same strain of the reptilian parasite, *Entamoeba invadens*, which were grown in Dobell's diphasic *HSre* and fluid *hs* media, with the addition of starch, the amoebae in both sub-strains being associated with 2 species of bacteria, of which organism *x* was common to both; *Bacterium coli* was present in the flora of sub-strain A, and *Bacillus megatherium* in M. Having noticed that the cysts of sub-strain M were larger than those of sub-strain A, the author measured 1,000 cysts in each of 4 cultures represented by the 2 sub-strains, each grown in the 2 media employed. The frequency distribution of cyst measurements and their statistical analysis have shown that, while the ranges of sizes for the 4 cultures were similar, there was a significant difference (about 2·5 μ) between the mean cyst diameters of M and A from the same media, as well as between cysts of the same strain grown in different media. This difference between A and M in different media is illustrated by curves. It is also shown that the combined measurements of cysts of the 2 sub-strains in both media fitted a unimodal curve.

From the statistical data it is concluded that each of the sub-strains was represented by one race only, but the observed difference in the size of their cysts was determined by the concomitant bacteria and the media in which they were cultivated, which affected the growth rates of the amoebae. Thus, it was found that A multiplied much more rapidly than M, producing smaller amoebae with correspondingly smaller cysts.

In discussing the bearing of her findings on *E. histolytica*, the author points out that in the human parasite the large and small races differ not only in dimensions but also in pathogenicity and other characters, on account of which they can be regarded as true races [this *Bulletin*, 1943, v. 40, 53]. [As a further argument, it may be added that the 2 races of *E. histolytica* may co-exist in the same individual host, *i.e.*, in an identical environment.] As regards the variation in the size of cysts in *E. invadens*, since it is adaptive and environmentally induced, it cannot be regarded as a valid racial character. [In fact, the 2 " races " of *E. invadens* might be regarded as enduring modifications (*Dauermodifikationen*).] *C. A. Hoare*

Faiguenbaum, J. Consideraciones clínicas sobre lambliasis. [**Clinical Considerations on *Giardia intestinalis* Infections**] *Bol. Chileno de Parasit.* 1954, July–Sept., v. 9, No. 3, 80–82.

The English summary appended to the paper is as follows:—

" A review of current clinical aspects of *Giardia lamblia* [*intestinalis*] infections is given.

" The importance of this parasite as a pediatric problem is emphasized. Actually, there is little doubt that the protozoon, in children, is often associated with acute or chronic enteritis and with a variety of general and nervous symptoms, which are cured by the specific therapy. In adults, the carrier condition is much more common and, except some few cases of chronic diarrhea similar to those found in children, the importance of the parasite as an etiologic factor is, in many cases, very questionable.

" The literature on the clinical aspects and therapy is briefly reviewed."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Davis, G. E. & Hoogstraal, H. **The Relapsing Fevers: a Survey of the Tick-Borne Spirochetes of Egypt.** *J. Egyptian Pub. Health Ass.* 1954, v. 29, No. 5, 139–43.

This is a preliminary report of a survey of the tick-borne diseases of Egypt undertaken by the U.S. Naval Medical Research Unit No. 3 in Cairo, and the Rocky Mountain Laboratory of the U.S. Public Health Service, Hamilton, Montana.

Numerous specimens of *Ornithodorus d. delanoei*, *O. savignyi*, *O. salahi* and *O. arenicolous* were collected, but no spirochaetes were recovered from them and the present report deals only with *O. erraticus*. Two hundred and fifteen lots were collected in Egypt and sent to the Rocky Mountain Laboratory for examination. Spirochaetes were recovered from 76 of the 215 lots, with more than 200 individual recoveries representing all the general areas studied and all hosts except *Meriones* sp. (4 small lots), two reptiles and *Bufo*.

Pathogenically the spirochaetes belong to the group which includes 4 specific names: *Spirochaeta crocidurae* from Senegal; *S. microti* from Persia; *S. merionesi* from Morocco; and *S. dipodilli* from Kenya.

Transmission experiments were made with 95 Egyptian ticks in 5 groups, white mice heavily infected with the strain of the Egyptian spirochaete being used. Only 19 were positive and 10 of these were from the 21 ticks fed on a mouse infected with the spirochaetes recovered from the same original lot as these ticks. *Edward Hindle*

Hoogstraal, H., Salah, A. A. & Kaiser, M. N. **Summary of the Known Distribution and Biology of *Ornithodoros erraticus* (Lucas, 1849) (Ixodoidea, Argasidae) in Egypt.** *J. Egyptian Pub. Health Ass.* 1954, v. 29, No. 5, 127–38, 1 fig.

The authors give a useful summary of information on *Ornithodorus erraticus* in Egypt based mainly on the results of 18 months' intensive search by the Medical Zoology Department of the U.S. Naval Medical Research Unit No. 3 (Cairo). Previously the only known record of this species in Egypt was by Hirst (*Bull. Entom. Res.*, 1914, v. 5, 215) who reported 60 immature specimens from *Rattus rattus* and *Arvicanthis niloticus* in Asyut Province. The authors find that *O. erraticus* is widespread throughout the country, over 5,000 specimens having been obtained in about 400 collections from about 150 localities ranging from the Mediterranean to Qena Province and from the Libyan to the Palestinian borders.

The ticks occurred in deserts, cultivated areas and urban communities, living in nests, burrows, dens and shelters of vertebrates, including several species of rodents, hedgehogs, foxes, owls, large lizards and toads. The hedgehog was one of the most common hosts, and among desert rodents *Meriones crassus crassus* and *M. shawi shawi*.

The burrows of gerbils, *Gerbillus gerbillus* and *G. pyramidum*, were seldom infested, but the tiny dipodils, *G. mariae* and *G. amaenus* were often attacked. On several collecting trips each of the authors was bitten by *O. erraticus*, and the tick doubtless feeds on children playing in the vicinity of rodent burrows, or persons sleeping on the ground. It seems to be absent from the Mediterranean fringe of the delta, and from extreme desert situations, saline oases, sand dunes, certain depressions, such as

Wadi Natroun, and the mountains (3,000–6,000 ft.) of south-central Sinai Peninsula.

The specimens mostly belonged to the "small race", but a very few were borderline individuals approaching the "large race".

Edward Hindle

Baltazard, M., Pournaki, R. & Chabaud, A. G. Sur les fièvres récurrentes à ornithodores. [**Relapsing Fevers carried by** *Ornithodorus*] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 4, 589–97. [11 refs.]

The authors have studied a strain of spirochaete belonging to the group *crocidurae*, which was isolated in Turkey by Özsan and Akyay [this *Bulletin*, 1955, v. 52, (157)], from a dwarf race of *Ornithodorus erraticus*. A study of its behaviour in experimental animals confirmed the diagnosis and the authors then tested its behaviour in *O. erraticus* from various localities—Hessarek, Ispahan and Bushire, Persia; and El Baroda, Egypt. The batches of ticks were fed on heavily infected animals and subsequently tested one by one, both by feeding experiments and inoculation of ground-up contents into susceptible animals. The batches of ticks from Hessarek and Ispahan were completely negative; while those from Bushire and El Baroda gave only a small percentage of positive results.

These experiments support the authors' view as to the regional specificity of the transmitting agent, and the practical impossibility of distinguishing either species or varieties in the association *O. erraticus–Spirochaeta crocidurae*.

It is now known that there are all intermediate stages between the dwarf race of *O. erraticus*, infected with spirochaetes of the group *Spirochaeta crocidurae*, and the large race, infected with the group *hispanica*. But great variations in size are found in the same areas or even in the same burrows, and while in Morocco the large race is infected only with *S. hispanica*, in Egypt the large race as well as the small are infected with *Spirochaeta crocidurae*. In Tunis the *O. erraticus* is of medium dimensions and transmits both groups of spirochaetes with equal facility.

The authors then discuss various hypotheses to explain the Turkish epidemic. It may have been due to heavily infected wild *O. erraticus*, although this is regarded as unlikely since the species does not frequent human habitations in that country. There is also the possibility of lice or bugs having spread the outbreak, or the unknown existence of the domestic *O. tholozani*. This species, however, has now become very rare in Turkey as a result of the use of DDT.

The Asiatic relapsing fever is very widespread and endemic and is closely linked with its human host, thereby being more easily controlled, while the Spanish-North African strain is sporadic and more difficult to deal with owing to the existence of wild reservoirs of the disease. *Edward Hindle*

Heisch, R. B. & Furlong, M. **Control of** *Ornithodorus moubata* **(Murray) by Gammexane.** *East African Med. J.* 1954, Dec., v. 31, No. 12, 561–2.

Tests of gamma BHC for control of ticks were done in 2 villages in the Coastal Province of Kenya. Most of the treatments employed a suspension of P 520 Gammexane, applied to the floors of huts (and the walls up to 12–18 in.) to give a dosage of 20 mgm. gamma isomer per sq. ft. A few huts were dusted with 0·5 per cent. gamma BHC powder at 4 lb./1000

sq. ft. (about 9 mgm. gamma isomer per sq. ft.). The huts were searched at weekly intervals after treatment, and large numbers of *O. moubata* were usually found in the control (untreated) huts. Ten huts were treated in one village and 20 in the other. In all cases the ticks were greatly reduced, especially in the huts treated with wettable powder suspension. After 8 weeks at one site, and 14 weeks at the other, a second treatment was given of gamma BHC suspension throughout. The ticks soon vanished after this from all 30 treated huts and only reappeared in 2 of them after 8 months and a further 2 after 10 months.

[Gamma BHC has been recommended by various authors for control of *Ornithodorus*, but with considerable differences in dosage. The following have been recorded as effective:—

Author	*Reference* (this *Bulletin*)	*Dosage mgm. gamma/sq. ft.*	*Formulation*
Hocking	1946, v. 43, 681.	2 applications of 150	crude BHC
Anderson	1947, v. 44, 1070.	3 applications of 200	3% oil solution
Jepson	1948, v. 45, 342.	7 to 9 applications	0·5% dust
Teesdale	1952, v. 49, 869.	5 applications	,,
Annecke & Quin	1952, v. 49, 869. 1953, v. 50, 30.	300 to 600 applications	suspension
Gil Collado	1954, v. 51. 1166.	34 applications	emulsion or suspension.]

J. R. Busvine

YAWS AND OTHER TREPONEMATOSES

Mills, A. R. **The Incidence of Yaws in the New Hebrides.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 58–61.

This is a valuable record of observations made in the scattered hot, humid islands of the New Hebrides. It is noted that malnutrition is very rare and villages are often small. Nevertheless, in the more remote areas yaws shows a high incidence. Reluctance to attend for treatment and the limitations of pidgin English were difficulties encountered. Where a follow-up was possible the results of a single injection of PAM, *i.e.*, procaine penicillin G (misprinted as C) in oil with 2 per cent. aluminium monostearate (adult dose 1·2 mega units), were good.

This survey has outlined the problem and should be regarded as the first step in eradicating the disease on the lines recommended by WHO [this *Bulletin*, 1953. v. 50. 775]. *Frederick J. Wright*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Sicault, G. & Rollier, R. La lèpre au Maroc. [**Leprosy in Morocco**] *Bull. Inst. Hyg. Maroc.* 1953, v. 13, Nos. 3/4, 131–74, 3 pls., 2 text figs. & 1 folding map.

The number of people with leprosy in Morocco has been variously estimated in different years: 458 in 1937, 183 in 1947 and about 800 in 1952. The present estimate makes the number approximately 1,000. In the regions of Casablanca and Fez the rate rises to 2·06 and 2·11 per 10,000. The types of disease, some diagnostic features, complications, etc., are commented on, and results with different forms of treatment are described. The methods for control advocated are: compulsory notification, seeking out all cases, rigorous isolation of open cases, preferably in agricultural colonies. *Ernest Muir*

South Pacific Commission. Noumea, New Caledonia. **Leprosy in Western Samoa and the Cook Islands. A Survey** [Sloan, N. R.]. *Technical Paper No. 69.* 1954, Oct., mimeographed pp. v + 23, 3 maps. [2s.]

A description is given of the Western Samoa Islands, Upolu (population 61,348), Savai'i (population 23,561) and 2 small off-shore islands. During 18 days 3,688 people were seen and 4 new cases of leprosy diagnosed. Including those transferred to Makogai there are 96 known cases of leprosy from these islands. In the Cook islands, 12 of which are inhabited and 3 uninhabited, with a total population of about 15,000, a 17 days' study in which 1,275 people were examined showed 1 new case and confirmed 41 previously diagnosed. The total of known cases, including active and arrested, and those transferred to Makogai, is 179. The low percentage of lepromatous cases is encouraging, and the disease appears to have almost entirely disappeared from the northern islands. It seems probable that the adequate programme of diagnosis and treatment will bring the disease under control within a reasonable time. *Ernest Muir*

South Pacific Commission. Noumea, New Caledonia. **Leprosy in American Samoa. A Survey** [Sloan, N. R.]. *Technical Paper No. 62.* 1954, July, mimeographed pp. v + 7, 2 maps. [2s.]

After a general description of Tutuila, an island of American Samoa, and the small neighbouring island of Aunuu, and of the condition, habits, etc., of the inhabitants, the results of a 3 weeks' leprosy survey are detailed. Four thousand of the 19,000 population were examined, and 6 new cases of leprosy discovered, all of them schoolboys. There were 40 other known cases, active and arrested, all of them transferred previously to the leprosarium of Makogai in Fiji. All the 6 new cases were either tuberculoid or indeterminate, and it is considered that the disease is diminishing. A new leprosarium should be completed and the patients transferred to it from Makogai. Surveys should be continued and all patients treated, preferably with DDS, closed cases receiving out-patient treatment. *Ernest Muir*

Bechelli, L. M. Contribuição ao estudo da lepra hepática. (Estudo clínico.) [**Contribution to the Study of Leprosy of the Liver**] *Rev. Brasileira Leprologia*. S. Paulo. 1954, Mar., v. 22, No. 1, 1–94, 15 figs. & 3 graphs. [76 refs.]

This paper includes the results of a pathological study of the livers of 91 leprosy patients and the clinical examination of over 1,000 patients, along with liver function tests.

In 95·31 per cent. of the lepromatous cases there were leprous lesions of the liver. These took the form of lepromatous infiltration round the portal vein branches, lepromatous induration and cirrhosis. Occasionally the infiltration extended to the adventitia. In only a few cases was there amyloid degeneration. The liver was increased in weight in about half the patients, but seldom exceeded 3 kgm. The amyloid condition was present in enlarged livers. In 4 of the 91 necropsies there was tuberculosis of the liver as well as leprosy, though in 1 the diagnosis between tuberculosis and tuberculoid leprosy was doubtful as inoculation of guineapigs was not done. On palpation of 1,013 patients enlargement of the liver was found in 30·3 per cent., the enlargement being present in 34·08 per cent. of lepromatous cases, 35·48 of secondary neural type and 17·1 per cent. of neural type. But in the neural cases the enlargement was due to causes other than leprosy. More than two-thirds of the lepromatous patients with lesions of the liver had no subjective symptoms; in the rest there was a feeling of fulness, heaviness, physical indisposition and drowsiness. When the edge of the liver was thickened and firm in consistence it was generally due to amyloid disease. Sometimes there was an appearance of jaundice. In only one patient was there cirrhosis.

The urobilinogen reaction, tested in 1,049 patients, was positive in only 4·7 per cent. of lepromatous patients, but there was urobilinuria and a positive galactose test in 17·7 and 20 per cent. respectively. In one-third of 70 patients examined there was a diminished cholesterol rate, but this was probably due to causes other than leprosy. The Meltzer-Lyon test on intubation of the duodenum in 7 patients showed the presence of pus in one patient. Tests for bilirubin, the Takata reaction and other liver-function tests were also done. These tests were considered to be of value in confirming diagnosis and regulating treatment. Even when there was considerable enlargement of the liver there was seldom much interference with function. [This work was originally completed in 1941, but for various reasons could not be published until now.] *Ernest Muir*

Floch, H. & Gélard, A. M. La DDS-retard en injections intramusculaires mensuelles. [**" Delayed " DDS in Monthly Intramuscular Injections**] *Bull. Acad. Nat. Méd.* 1954, v. 138, Nos. 31/32, 523–8. [15 refs.]

Slow-acting therapeutic effects of drugs have been attempted by different methods: by those relating to the organism, to the medium for giving the drug, or to active molecules of the drug. In administering DDS in leprosy the authors had contemplated the implantation of tablets in the tissues of the patient, but this was found to be impracticable. Suspensions of DDS in chaulmoogra and other oils or their esters, or in a colloidal medium, in order to cause retardation of absorption by means of the nature of the suspending fluid, were found to give irregular and therefore unsatisfactory results. Much effort has been put into producing DDS in a soluble form in order that daily intravenous injections might be given, but this entails

excessive labour, and in a disease which may have to be treated for many years would be intolerable.

The method suggested in the present paper is the use of a suspension of DDS crystals large enough to be absorbed slowly, but small enough to pass through the needle. These crystals are isolated by passing through a filter or sieve of suitable mesh and are 200 to 500 μ in length. They are obtained by cooling after heating for sterilization. They are suspended in 2 per 1000 agar in normal saline. A monthly intramuscular injection of 1·8 gm. suspended in 12 cc. of medium maintains an effective blood concentration for 31 days, varying from 0·31 mgm. per cent. after the 1st day to 0·25 mgm. on the 15th and 0·08 mgm. on the 31st day. However, it is necessary to initiate new patients for the first 3 months by giving small, gradually increasing, weekly or fortnightly injections. The suspension is made up in ampoules. The authors recommend the administration of iron during the earlier stages of the treatment. *Ernest Muir*

Lowe, J. **The Treatment of Leprosy with TB1/698. A Report based on 38 Months' Experience.** *Leprosy Review.* 1954, Oct., v. 25, No. 4, 186–99.

This is a more detailed account of what the author has already published on this subject. [See this *Bulletin*, 1955, v. 52, 54.] Compared with sulphones TB1 has 2 advantages: when there are repeated and severe reactions with sulphones, TB1 is generally better tolerated, and in some patients initial improvement is quicker than with sulphones. There are, however, 4 disadvantages: TB1 is more dangerous when there are toxic effects, as the bone-marrow and liver are affected; the late results are less satisfactory with TB1 and a stage is reached in which there is not only no further improvement but even clinical and bacteriological deterioration, a result not found with sulphones; TB1 has to be given once or twice daily whereas sulphones can be given at much longer intervals, even fortnightly; TB1 costs considerably more. TB1 should therefore be reserved for patients allergic to sulphones, or in whom sulphones produce serious toxic symptoms, severe neuritis or eye inflammation. *Ernest Muir*

Relvich, A. L. **The Treatment of Tuberculosis in Leprosy Patients.** *Leprosy Review.* 1954, Oct., v. 25, No. 4, 179–86. [12 refs.]

The literature on combined treatment of tuberculosis and leprosy is reviewed. Between 1947 and 1951 50 cases of tuberculosis were diagnosed among some 5,000 leprosy patients in the Ossiomo Settlement, Nigeria. Of these 45 have died. With the introduction of sulphone treatment in 1950–51 there was no improvement as regards tuberculosis. With the introduction of thiosemicarbazone in January 1952 " out of 16 patients who received that treatment until September 1953 only three have died ". Only in 1 had the sputum been rendered negative. In September 1953, 13 patients began to be treated with 1 gm. of streptomycin on alternate days and 100 mgm. of isoniazid twice daily, and 5 more patients were added to the list later. Clinical notes of these 18 patients are given. PAS, 20 gm. daily, was substituted for streptomycin in 2 of the patients in whom the sputum had not become negative in 4 to 5 months. Examinations were made as regards improvement in leprosy and tuberculosis at 3-month intervals.

After a few weeks there was a great subjective improvement in the patients. In all but one case tubercle bacilli had disappeared from the sputum within 2 to 4 months. There were no side-effects, and in none had the treatment to be stopped. The improvement as regards leprosy was not as satisfactory, and these drugs are considered unsatisfactory for the treatment of leprosy as compared with the sulphones and thiosemicarbazone. "It appears that even in the treatment of tuberculosis in leprous patients, it would be advantageous to combine them [streptomycin and isoniazid] with either sulphones or thiosemicarbazone in order to deal effectively with patient's leprotic condition." *Ernest Muir*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

VON BRAND, T. & MEHLMAN, B. **Relations between Pre- and Post-Anaerobic Oxygen Consumption and Oxygen Tension in some Fresh Water Snails.** Reprinted from *Biol. Bull.* 1953, June, v. 104, No. 3, 301–12, 1 fig. [18 refs.]

"1. The respiration of four species of fresh water snails was somewhat dependent on the oxygen tension below 21 per cent oxygen with only minor differences among the various species.

"2. The degree of dependency was influenced little, if any, by alteration of the metabolic rate of *Australorbis glabratus*, but some changes were obtained in the cases of *Helisoma duryi* and *Lymnaea stagnalis*.

"3. All species showed a long lasting respiratory rebound after 16 hours' anaerobiosis. The post-anaerobic respiration was more dependent on the oxygen tension than the pre-anaerobic respiration if referred to the normal rate shown at 21 per cent oxygen. But if the post-anaerobic rates were compared with the rates sustained pre-anaerobically at an identical oxygen tension, an approximately equal percentage increase was observed over a wide range of tensions.

"4. The implications of these observations and auxiliary observations dealing with the rate of the heart-beat under various conditions are discussed insofar as they shed light on the mechanism of the pre- and post-anaerobic respiration. It is concluded that diffusion alone cannot be the sole limiting factor that reduces the over-all oxygen consumption when the tension is lowered below a critical point, and the idea is discussed that the oxygen tension as such may be more important for certain cellular processes than usually assumed."

OLIVER-GONZALEZ, J., BAUMAN, P. M. & BENENSON, A. S. **Intradermal Response to Egg Antigen in Humans with Active and Treated (Fuadin) *Schistosoma mansoni* Infections.** *Proc. Soc. Exper. Biol. & Med.* 1954, Oct., v. 87, No. 1, 186–8, 2 figs.

There is no record in the literature of the use of an antigen prepared from *Schistosoma mansoni* eggs for intradermal tests in the diagnosis of

schistosomiasis. *S. mansoni* eggs were obtained from the livers of experimentally infected mice about 8 weeks after infection. Saline suspensions were made of 3 such livers, after the adult worms had been removed. These were ground in a Waring blendor, the eggs thereafter being separated by repeated sedimentation in salt solution to prevent hatching. The purified egg suspension was then washed rapidly in 3 changes of distilled water, frozen in a dry-ice-alcohol mixture, and lyophilized. In addition to this a concentrated suspension of cercariae was prepared, frozen, and lyophilized. Antigens were prepared from each suspension by putting the appropriate lyophilized material in 0·85 per cent. sodium chloride to make a 1 per cent. suspension; this was ground up and then subjected to repeated shaking overnight at room temperature. The clear supernatant fluid was removed after centrifugation, and constituted a 1 in 100 stock solution; from this 1 in 10,000 concentrations were made by dilution with saline containing 0·5 per cent. phenol, and these constituted the antigens used.

Intradermal tests with these antigens were done on 21 Americans who had not been exposed to the risk of schistosomal infection, and 104 Puerto Ricans all with long-standing *S. mansoni* infections. A positive test was read when 0·05 ml. of antigen introduced intradermally produced a weal which 15 minutes later had increased so that the sum of its diameters at this time was at least 4 mm. greater than the sum of the diameters of the original weal.

By this technique 95·2 per cent. of the Puerto Ricans gave a positive reaction to the cercarial antigen, but only 25·6 per cent. to the egg antigen. None of the Americans gave positive reactions with either antigen. The data for the various patients are set out in tables, and there are some photographs of the reaction to cercarial antigen in a couple of cases.

The authors found that of the 36 infected persons who had had no treatment 33 (91·7 per cent.) were sensitive to the cercarial antigen, whereas only 3 (8·3 per cent.) were sensitive to the egg antigen. Of 33 Puerto Ricans specifically treated within the preceding year all were sensitive to the cercarial, but only 9 (27·3 per cent.) to the egg antigen. Of 35 who had been treated earlier than this 33 (94·3 per cent.) were sensitive to the cercarial and 25 (71·4 per cent.) to the egg antigen. The ratio of untreated persons sensitive to cercarial antigen but not to egg antigen was unexpected; the authors attribute it to the fact that the parasites in these patients were shedding viable ova; after the arrest of oviposition by successful treatment the proportion of those showing sensitivity to egg antigen rose and began to approach that of those sensitive to cercarial antigen. There is thus immunological evidence of different types of antibodies which react with one phase of the parasite only. Determination of the skin sensitivities might therefore be used to differentiate persons who may be presumed to have active infections from those whose worms have perished either spontaneously or as a result of treatment.

A. R. D. Adams

Cleve, E. A., Langsjoen, P. H. & Hensler, N. M. **The Toxic Effect of Tartar Emetic in Treatment of Schistosomiasis.** *Amer. J. Med. Sci.* 1955, Jan., v. 229, No. 1, 74–80, 1 fig. [19 refs.]

The authors give an account of 3 patients, all suffering from schistosomiasis, who were treated with tartar emetic (antimony potassium tartrate) and developed alarming toxic reactions involving especially the myocardium. The drug was given, usually on alternate days but with an occasional longer

interval, to totals of 1·24 gm. [19 grains], 0·91 gm. [13·5 grains], and 0·90 gm., respectively, in these three cases; the treatment had then to be stopped in each case on account of severe toxic reactions associated with fever, dyspnoea, substernal pains and, in some, haemoptysis, cyanosis or vomiting. The electrocardiograms showed negative, or flattened, T waves at this time; within a month all had returned to normal. The second patient subsequently had a second course of tartar emetic totalling 1·79 gm. [28 grains], and the third patient also had a second course totalling 2·12 gm. [32 grains]. The first patient was a Puerto Rican male, weighing 125 pounds, infected with *Schistosoma mansoni*; the second was a Filipino male, weighing 110 pounds, infected with *S. japonicum*; and the third was a white male, weighing 165 pounds, infected with *S. japonicum*.

The authors review the literature on the distribution and fate of antimonials in the body, and on the recognized toxic manifestations they may cause. There is agreement that electrocardiographic evidence of a toxic myocarditis often develops during tartar emetic treatment, and that this vanishes within a month of stopping it. The recommended therapeutic dose of tartar emetic is very close to the toxic dose, especially in those weighing under 150 pounds; so this drug should be given with caution to undernourished and undersize persons. *A. R. D. Adams*

Friedheim, E. A. H. **Principles of developing New Chemotherapeutic Agents.** *J. Egyptian Pub. Health Ass.* 1954, v. 29, Nos. 1/2, 27–41.

This is a general lecture on chemotherapy, delivered in Cairo in 1953. It contains much which is of general interest, but it cannot be adequately reproduced as an abstract. The generally accepted theory of Ehrlich and Voegtlin asserts that the toxic and parasiticidal effects of arsenic are due to the blocking of protoplasmic thiol groups. But Friedheim questions whether this is correct in all cases; he points out that the combination of many derivatives of arsenic, antimony, or bismuth with BAL diminishes the toxicity of these compounds more than it does their parasiticidal action, so that their chemotherapeutic ratio is increased. Examples of this are given by the combinations of BAL with melarsen, carbarsone, acetarsone and bismuth.

In a discussion of antimony compounds, it is pointed out that (by the law of mass-action) the toxicity of tartar emetic is much diminished by mixing it with the corresponding organic radical, *i.e.*, potassium tartrate. Similarly, the toxicity of Fouadin is diminished by mixing with catechol-disulphonate. A mixture of " 1 mol of tartar emetic and 3·5 moles of catechol-disulphonate " has been given to 67 cases of mansonian schistosomiasis in Brazil (9 intramuscular injections during 18 days to a total of 500 mgm. Sb). The tolerance was excellent and 4 months after treatment 93 per cent. of the patients had ceased to pass eggs.

A description is given of a new antimony compound called TWSb. In this, the antimony is combined in a stable ring with two sulphur and two carbon atoms, so that no free ions of Sb are liberated on solution. The compound is closely analogous to tartar emetic in which the oxygen atoms next to Sb are replaced by sulphur. This compound has been tried on mansonian schistosomiasis in Brazil with promising results [see this *Bulletin*, 1955, v. 53, 56].

Finally reference is made to the antimony compound MSb. This is a polymerized form of melaminylphenylstibonic acid. The polymerized form is non-toxic and non-active but after injection it very gradually decomposes

to liberate the active non-polymerized form; in this way prolonged prophylactic effects can be produced in experimental infections of trypanosomiasis and filariasis. *F. Hawking*

Mohr, W., Fischer, I. & Born, W. Umgebungsuntersuchungen bei *Fasciola hepatica*-Fällen in Norddeutschland (Grafschaft Hoya). [**Survey of *Fasciola hepatica* Infection in Northern Germany**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, Nov., v. 5, No. 4, 469–77, 1 map. [16 refs.]

The English summary appended to the paper is as follows:—

"The occurrence of two human cases of *Fasciola hepatica* infection in the county of Hoya, Lower Saxony, suggested a helminthic survey of the neighbouring villages in order to discover further latent infections. 214 persons, mostly children, were examined physically, the blood picture was taken and the urine tested; the feces were searched for worm eggs two or three times; in suspect cases, the complement fixation test for *Fasciola hepatica* (Minning and Vogel) was made. Eosinophilia of 8 to 26 per cent was found in 25 cases. Eggs of *Trichocephalus* were found ten times, *Ascaris* once, *Oxyuris* twice. The search for *Fasciola hepatica* was entirely negative.

"The circumstances of occasional *Fasciola hepatica* infections in post-war Germany are discussed. It is expected that the probability of such incidents will diminish with improving sanitation."

Sphangos, J. [**On Case of Human Distomiasis**] *Arch. Hyg.* Athens. 1954, Jan.–Mar., Nos. 1/3, 83–5. [In Greek.]

The English summary appended to the paper is as follows:—

"The author describes a case of human distomiasis, due to Distoma Heterophyes heterophyes. The patient was a man 58 years old, complaining in particular of strong pains in the upper abdominal region, extending towards the stomach and the right hypochondrium, of diarrhoea, occasionally mucous, alternating with constipation, of depression and loss of appetite. Examination of feces, by the author, showed a great number of eggs belonging to the above mentioned species. The infection was due to the consumption of fish of the species Nugilcephalus, which is the intermediary host of the Distoma Heterophyes heterophyes and is plentiful in the Missolonghi region, whence the patient came. He often ate fish of this kind, salted or smoked. It is to be noted that no mention of presence of this parasite in Greece or other European countries exists in the relative bibliography."

Sandars, Dorothea F. **A Sparganum from a Queensland Woman.** *Med. J. Australia.* 1954, Nov. 20, v. 2, No. 21, 817–18, 2 figs. on pl.

The author refers briefly to probable cases of sparganum infections in Australia earlier in this century and then records a case which occurred in a woman of 38 in Queensland in 1953.

The patient complained of a small subcutaneous nodule in the inside of the right thigh, which had been noticed some 2 months previously. When the lump increased in size and a second one developed in the same area within a fortnight the nodule was excised. It was hard and fibrous and contained a "flat long white worm".

The worm was identified microscopically as a sparganum lying in the subcutaneous tissue at a depth of about 4 mm. It was surrounded by fatty areolar tissue, in which there was a mixed inflammatory reaction, mostly of the " foreign body " type, but containing many scattered groups of eosinophils.

It is pointed out that *Diphyllobothrium erinacei* has a wide distribution and host range in animals in south-east Queensland and New South Wales. It seems probable that man may serve as a reservoir host. The spargana of this parasite are very sticky and human infection could occur readily through the handling of infected meat.

Wild pigs have been shown to be infected with this parasite in the area concerned and the incidence may be greater than the records indicate.

A year before the lumps appeared the present patient had been camping outside Talwood near the Queensland and New South Wales border, and had been the only member of the party to prepare and cook the meat of wild pigs shot there. She was also apparently the only one to develop any lumps. Circumstantial evidence suggests that this was the origin of the infection and that it was probably due to the sparganal stage of *D. erinacei*.

It is suggested that the fact that so few human cases have been recorded in Australia may be explained by the circumstance that the lumps may pass unnoticed or that when such lumps have been removed the true cause has not been diagnosed. *H. J. O'D. Burke-Gaffney*

Lepeš, T. Prilog poznavanju rasprostranjenosti i lečenja tenijaze kod nas. [**The Incidence and Treatment of Taeniasis in Jugoslavia**] *Higijena.* Zagreb. 1954, v. 6, No. 2, 178–85.

The English summary appended to the paper is as follows:—

" Of four most frequent species of tapeworm in man, only three have so far been found in Jugoslavia:

Taenia saginata, Goeze, 1872.

Taenia solium, Linné, 1758, and

Hymenolepis nana, Von Siebold, 1852.

" Taenia saginata is found in man and cattle in Bosnia, Kosmet, Sandžak and Monte Negro, where in some areas more than 15% of inhabitants carry tapeworms, and more than 30% of cattle its cysticercus larvae.

" Taenia solium is mostly found in Serbia, Macedonia and Croatia where smoked meat is frequently consumed. Both species of tapeworm are usually restricted to small areas. This fact can be explained by the preparation of meat, by hygienic habits of the population and conditions in which the cattle are kept.

" In the diagnosis of taeniasis the author mostly uses the perianal swab (adhesive cellophane-tape and N. I. H. Swab) and his own modification of Lörincz flotation method.

" The author treats taeniasis by the intraduodenal application of the solution of Atabrine 0·02 g per kilogram body weight of the patient with the preceding preparations and following it by purging with Epsom salt.

" In the author's opinion the drug calls forth an oedema of intestinal mucosis, which causes the suckers of scolex to detach themselves of the mucosis.

" 130 cases have been treated in the field and not one case of intoxication by Atabrine was found. The success of the therapy was always complete if the patient was prepared accordingly, if the drug was indeed applied intraduodenally and if the patient had not vomited.

"The author recommends a wider application of the prevention of taeniasis, and a systematical removal of its source of infection by curing the tapeworm carriers in the field, and by bettering the hygienic standard in menaced areas."

Szkutnik, Z. Zagadnienie wyjaławiania wągrowatego mięsa wieprzowego. [**The Problem of Sterilization of Measly Pork Meat**] *Ann. Univ. Mariae Curie-Skłodowska.* Lublin. Sect. DD. 1953, v. 8, 17–31, 1 chart. [10 refs.]

The English summary appended to the paper is as follows:—

"The aim of this work was to determine the lowest concentration of NaCl in the muscle tissue, which kills porcine measles (Cysticercus cellulosae). The studies were conducted on isolated measles and on measles present in the muscle tissue. To determine the viability of measles two methods were used: a 50% solution of bile in physiological solution at the temperature + 42°C. and a method of staining with Grenacher's alum carmine, elaborated by the author.

"The lowest concentration of NaCl in the muscle tissue, at which always dead measles were found was 4·5%. Measles die also at lower concentrations, but not all of them. The speed of penetration of salt to the same depth of the muscle tissue of the ham is not uniform and depends on the anatomical structure and the topography of the given part of muscles. The finding of a concentration of brine above 4·5% in the deepest parts of muscles is not a guarantee that there are not lower concentrations; therefore in the practice only the duration of pickling plays a decisive role in the sterilization of measly pork meat by pickling.

"The corresponding Polish prescription recommends pickling of measly pork meat to destroy measles in 20% solution of brine during a period of 3 weeks (21 days). The author using bile and the staining method found, however, after 22 days of pickling the presence of 17 live measles and on this basis he draws the conclusion, that only by thermic factors it is possible to sterilize measly pork meat completely and with certainty."

Cosco Montaldo, H. Quiste hidático del hígado. Contribución al diagnóstico precoz. [**Hydatic Cyst of the Liver. Contribution to Early Diagnosis**] *An. Facul. de Med.* Montevideo. 1954, May–June, v. 39, No. 3, 249–66, 19 figs. [11 refs.] English summary.

Quattrocchi, G. & Russo, G. Primi dati statistico-clinici di due anni di attività di un dispensario antianchilostomiasico in Provincia di Messina. [**Statistical and Clinical Report of Two Years' Work at a Hookworm Dispensary in Messina Province**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Dec., v. 35, No. 12, 622–35. [16 refs.]

The English summary appended to the paper is as follows:—

"The authors worked during two years at a dispensary for ankylostomiasis in a heavily infected area near Messina. Stool examinations were performed on 1230 patients; among those who showed helminthic or protozoal infections, 35·6% (438 persons) had common hookworms in the faeces. Among those infected with hookworms 35·5% (156 persons) presented a definite clinical picture, while the others were simply carriers of the infection with no clinical symptomatology.

" After considering the relations between ankylostomiasis and the other parasitic infections common in the area, and after pointing out the prevalence of ankylostoma and the reasons for this prevalence, the authors give the clinical data and the haematological findings of the patients treated.

" At the end the authors sum up their clinical, therapeutical and epidemiological observations."

MIURA, K. **Studies on Chemotherapy against Hookworm Disease on the Effect of 1-Bromo-β-Naphthol.** *Japanese J. Med. Sci. & Biol.* 1954, June, v. 7, No. 3, 265–73.

Laboratory studies were made on toads (*Bufo vulgaris japonica*) infected with *Rhabdias bufonis* which seems to resemble *Ancylostoma duodenale*. The tests on the worms were carried out *in vitro*, presumably at room temperature. Either the worms were placed in concentrations of 1 in 1000 of the different substances and the time between immersion and death was measured; or the worms were exposed for 30 minutes to different dilutions, and then washed and observed for 24 hours, the maximum lethal dilution being thus determined. It was found that the 5 monobromo compounds of naphthol were highly toxic to *Rhabdias*, and that halogen derivatives of thymol were more effective than thymol itself.

The compounds were also tested *in vivo*. A dose of the compound was given to the toads by gastric sound and the number of living and dead worms in the faeces was counted for 7 days; after that the toads were killed and the intestines examined. Heavily infected toads contained 3,000 worms in the intestine. Thymol and naphthalene were not effective in removing the worms except in doses which killed the animal. β-naphthol had only slight action in its maximum tolerated dose; but the halogenated naphthols were very active, especially 1-bromo-β-naphthol. When tested on the tongue, this compound was irritating only in 1 in 10 dilutions or stronger, and it is less irritating than hexylresorcinol or β-naphthol. When tested in small numbers of mice, being given by mouth as a single dose, the minimum lethal dose of the compound was 40 mgm. per 20 gm. mouse; thus it was less toxic than most of the substances tested; it was only 1 in 4 as toxic as hexylresorcinol.

Clinical trial was carried out by Drs. IWATA, TODANI, and FUKEDA. They found 1-bromo-β-naphthol effective in removing *Ancylostoma* from man. One man received a dose of 23 gm. during a month without ill effects. It is effective without being a purgative. In another group 0·5 gm. was given twice to 54 schoolboys and it was highly effective against *Ancylostoma*; the side-effects, which were slight, included slight nausea, loss of appetite and stomach ache. In a third group, doses of up to 4·0 gm. 2–7 times were given to 17 patients. Complete disinfestation was achieved without side-effects in a case of severe anaemia. Altogether 117 patients have been treated. *F. Hawking*

MORISITA, T., KOBAYASHI, M. & NAGATA, J. **On the Hook-Worm Infection Circuit traced with Isotope P 32 Marked Larvae.** *Japanese J. Exper. Med.* 1953, Dec., v. 23, No. 6, 531–6, 1 fig.

" 1. We cultivated the rhabditiform larvae soon after the first ecdysis in Isotope P 32 containing solution and obtained the ensheathed filariform larvae in which bodies a large quantity of P 32 was included.

" 2. When the mouse, the indefinitive host, was infected per os with P 32 marked larvae, fair numbers of the larvae moved into host organs,

passing through the mucous membrane of the mouth or oesophagus. We could recognize that these larvae included P 32 in their bodies. But the majority of the larvae remained in the digestive canal and excreted P 32 in the bowel of the host when the larvae shedded their skins.

"3. In the case of infection per cutan, fair numbers of the larvae were found in the intestine within 4 hours and the oesophagus and small intestine contained a large proportion of the larvae even in their contents.

"4. When the dog, the definitive host, was infected with dog hook-worm larvae per cutan, there was no larva in the digestive canal. On this point, the behaviour of the larvae in the definitive host differs from that in the indefinitive host."

Núñez, Neida & Berio, A. Complicaciones quirurgicas de la ascaridiasis. [**Surgical Complications of Ascariasis**] *Bol. Asoc. Méd. de Puerto Rico.* 1954, Sept., v. 46, No. 9, 432–43, 1 fig. & 4 charts.

The authors bring together some of the literature on the surgical complications of ascariasis and discuss the features of the condition. They then record 42 such cases seen in the Children's Department of the Bayamón District Hospital, Puerto Rico, between 1950–1954. All were children between 1 and 8 years, and most were between 2 and 3. The complications occurred with equal frequency in those who had and those who had not received specific treatment. These complications appear to have increased in recent years.

Four deaths occurred in 11 patients subjected to operation and this high rate is attributed to the delay in bringing the patients to operation: in emergency cases this delay averaged 3½ hours. Death was due more to toxaemia from general peritonitis and to dehydration and electrolytic unbalance than to the actual presence of the worm.

The most frequent complication, partial obstruction of the intestine [*suboclusión*], occurred in 26 cases; perforation of the appendix accounted for 6 cases. There were 9 deaths altogether and these were caused mostly by general peritonitis. There were two cases of volvulus. The most serious complication is clearly brought about when the worm penetrates the peritoneal cavity. One case is described and the others are tabulated.

H. J. O'D. Burke-Gaffney

Beckett, A. H., Donbrow, M. & Jolliffe, G. O. **Ascaridole Studies. Part III. The Purification and Characterisation of Ascaridole.** *J. Pharmacy & Pharmacol.* London. 1955, Jan., v. 7, No. 1, 55–65, 4 figs. [19 refs.]

Abdulrachman, S. & Lie Kian Joe. **Morphological Differences between *Ascaris* from Man and Pigs.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1954, Dec., v. 6, No. 4, 342–4, 12 figs.

"The differences in form and size of the denticles in *Ascaris* from man and pigs are on the whole marked, but are not sharply defined. Out of 50 *Ascaris* worms from man one was found which could not be distinguished from those obtained from pigs and three were found in which the differences were ill defined. On the other hand out of 43 *Ascaris* from pigs there was one worm with denticles which could not be distinguished from those of the human *Ascaris*, while in seven other worms the differences were not marked. Though the differences in the denticles of these two worms are

not sharply defined they do support the opinion that *A. lumbricoides* Linnaeus, 1758, is not identical with *A. suum* Goeze, 1782 (*A. suilla* Dujardin, 1845)."

Cavier, R. & Savel, J. L'uréogénèse chez l'*Ascaris* du porc (*Ascaris lumbricoides* Linné, 1758). [**Urea Metabolism in Pig** *Ascaris*] *Bull. Soc. Chimie Biol.* 1954, v. 36, No. 10, 1425–31.

Cavier, R. & Savel, J. Contribution à l'étude de l'azote aminé chez l'*Ascaris* du porc (*Ascaris lumbricoides* Linné, 1758). [**Study of Amino Nitrogen in Pig** *Ascaris*] *Bull. Soc. Chimie Biol.* 1954, v. 36, No. 10, 1433–8, 2 figs. [22 refs.]

Jordan, P. **Filariasis in the Southern Province of Tanganyika.** *East African Med. J.* 1954, Dec., v. 31, No. 12, 537–42.

The Southern Province of Tanganyika is mostly dry and waterless except during the rains. The rainfall averages 30–60 inches a year. There is a narrow coastal belt which is warmer and wetter, and a similar smaller belt near Lake Nyasa. Blood films were taken after 8 p.m. from as many people as possible in the different villages. The microfilariaemia rate is calculated on the incidence in adult males. In general there is a high incidence of bancroftian filariasis at the coast, but on going inland this gradually decreases except in river valleys. In general, a high incidence is found where there is high temperature combined with high relative humidity. This occurs on the coast and round the great lakes. Typical rates (adult males) were: Kilwa, over 70 per cent.; Lindi, 20–56 per cent.; Songea practically nil; Lituhi on Lake Nyasa, only 3 per cent., which is lower than other areas round Lake Nyasa. The endemic area of *D. perstans* infections is smaller than that of *W. bancrofti*, but rates up to 40 per cent. were found in some villages. *W. bancrofti* was detected in 1 child aged 8 months and in 2 children aged 18 months; *D. perstans* was detected in 8 children aged 8–18 months. Elephantiasis of the legs was relatively uncommon, but hydrocele was common and troublesome. In some villages 30 per cent. (of the males who permitted examination) had hydrocele. Hydrocele and elephantiasis occurred mostly in the areas with a high rate of microfilaraemia. *F. Hawking*

South Pacific Commission. Noumea, New Caledonia. **Annotated Bibliography of Filariasis and Elephantiasis. Part I: Epidemiology of Filariasis in the South Pacific Region.** *Technical Paper No. 65.* 1954, Aug., mimeographed pp. vii + 63, 1 map. [5s.]

The Conference of Experts on Filariasis and Elephantiasis held in Tahiti in August and September 1951 recommended the constitution and distribution of an annotated bibliography on filariasis and related aspects. This task has now been undertaken and the results are being circulated in mimeograph form. The first part is now published and will be followed by others from time to time. Further issues depend upon the availability of the documentation. A map of the vast area covered by the work of the Commission is given on the cover of this brochure.

The report occupies some 58 pages and comprises 115 entries. Asterisks denote whether microfilms or reprints of the papers cited are available at the headquarters of the South Pacific Commission. The authorities cited refer, not to the whole of the literature, but only to that portion relating to Pacific filariasis commencing with a paper of DE ROCHAS in 1862. The annotations are brief, accurate and outstandingly fair. The more recent, since 1912, have been reviewed in this *Bulletin*.

This is an excellent compilation which does credit to all concerned in the welfare of the peoples of the historic islands of the South Pacific.

Philip Manson-Bahr

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **Distribution of Filariasis in the South Pacific Region** [IYENGAR, M. O. T.]. *Technical Paper No. 66.* 1954, Sept., mimeographed pp. vi + 52, 5 maps (4 folding coloured). [Numerous refs.] [5s.]

This report illustrates the excellent work which is being carried out by the South Pacific Commission. Since the advent of Dr. Iyengar to New Caledonia the investigations on filariasis have gone ahead, of which there is evidence in this publication. In the space of 47 pages we have here summarized a mass of instructive and accurate information.

There are, moreover, 4 excellent coloured maps of the Pacific setting forth: (1) the distribution and incidence of microfilarial infection; (2) the distribution and incidence of elephantiasis; (3) the distribution of the two forms of *W. bancrofti* infection; and (4) the principal and secondary vectors of filarial infection in different points of the South Pacific region. It is not surprising that on some of the smaller islands, such as Futuna in the New Hebrides, filariasis is absent, while from some of the larger and better known groups, as, for instance, Tonga, information is surprisingly meagre, and from the Phoenix islands, Line islands and Niue, there are no data at all.

This paper is the outcome of present knowledge, culled from many diverse sources and as such will be welcomed. To the reviewer it comes as a token of satisfaction as confirming the conclusions of his own work on the subject and as some indication of his views. The maps follow much the same lines as the one figured in the reviewer's work in 1952 [see this *Bulletin*, 1952, v. 49, 1061]. The report is well documented and it will undoubtedly stimulate a new interest in this subject and clarify some obscure and puzzling points. The determination of the two forms, the periodic and non-periodic, and the reasons for their distribution, remain a focal point of importance as indicating that some vital principle is involved. The high incidence of microfilarial infection in New Caledonia compared with the low filarial disease rate is a case in point, as is also the bizarre and puzzling relationship between the incidence of clinical filariasis and the elephantiasis rate. Although areas in south-east Asia, Ceylon and the Maldives have a very high incidence of elephantiasis, there are others associated with the non-periodic form in which it is very low, as in New Caledonia. From the evidence available it is clear that the comparatively low incidence of elephantiasis in the western parts of the South Pacific and the correspondingly high incidence in the eastern parts is not attributable to any difference in pathogenicity, but to differences in local conditions as regards opportunities for the establishment of hyperfilariation in the human host.

[The value of Map 4 would be much enhanced if the information on the distribution of the various subspecies of *Aëdes scutellaris* group, as worked out by MARKS (this *Bulletin*, 1952, v. 49, 168) and quoted in the reviewer's paper in 1952, were published in full and made generally available. This

report deserves serious study on the part of all interested in this subject and it serves as a testimony to the author's industry and as a monument of his assiduity.] *Philip Manson-Bahr*

McCarthy, D. D. & Fitzgerald, N. **Researches in Western Samoa. III. Observations on Filariasis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 82–9.

In this paper the results of a filarial survey in the village of Laulii on the north of the island of Upolu are described, together with the results of blood examinations of Samoans in the environs of Apia and also in Savai'i, the second island of the New Zealand Mandated Territories. This village was taken as typical of the coastal type of settlement.

Observations were based on the clinical inspection of 450 inhabitants and on the examination of a total of 955 blood samples. Thick blood films were 20 cmm. each and in all the total numbers of microfilariae were counted.

Total incidence of infection was assessed by the presence of microfilaraemia, palpable filarial glands, hydroceles, elephantiasis, etc. Microfilariae were found at the earliest at 7 years in males and at 9 in females. Thereafter the incidence followed the rule, increasing steadily with age, reaching its peak in both sexes in the fifth decade when 56·1 per cent. of males and 42·9 per cent. of females showed microfilariae. In the earlier age-groups the male incidence was approximately double that of the female. The general incidence for all ages of the group was 28·9 per cent. in males and 15·3 per cent. in females. As regards microfilarial density, the average for each age-group gave a maximum count in the fourth decade for males and in the fifth for females: the average being 82 per cmm. for males and 55 per cmm. for females in the peak age-groups. The average density was slightly higher in males than in females.

In the village of Laulii, the incidence of filarial infection, judged by the presence of one or more physical signs plus the presence of microfilariae, mounted steadily from the youngest to the oldest age-groups—from 2·6 per cent. in the 0–4-year group to 74·3 per cent. in those over 50 years of age. Again, throughout all age-groups the incidence in males was almost twice that in females. Microfilaraemia was found in 26·1 per cent. of males and 13 per cent. of females, enlarged epitrochlear glands were present in 20·8 per cent. of males and 5·5 per cent. of females, and so on.

The earliest age at which evidence of filarial infection was observed was 3 in a boy with enlarged inguinal glands. In males hydroceles were first observed in the 20–29 age-group while elephantiasis was not seen until late in the 30–39 age-group. The youngest case of elephantiasis was in a woman of 38. At the age of 40, 50 per cent. of women and over 90 per cent. of men were seen to exhibit some form of filarial disease.

The most striking feature is the great difference in incidence between men and women and, though similar figures have been noted elsewhere, as in Tahiti [this *Bulletin*, 1953, v. 50, 47], they have generally been of a less degree and it would appear that, in comparison with the findings of O'Connor [this *Bulletin*, 1923, v. 20, 5, 891] and of Buxton [*ibid.*, 1927, v. 24, 941], the incidence of the disease and of its signs has been undergoing a steady decrease during the last 30 years. Thus, in Upolu the percentage of microfilaraemia in persons over 16 has dropped from 67·6 per cent. to 45·7 per cent. in males and from 45·7 per cent. to 19·2 per cent. in females. In Savai'i, which is more sparsely populated, and the inhabited coastal area of which is more closely covered with bush, the decrease, though less, is

still striking, and in both the diminution has been greater in women than in men.

Buxton's figures in Samoa refer to males only, but, in comparison, the same recession is clear. The reason for this cannot be defined with certainty, but it does not appear to be due to planned control measures or to educational propaganda; it is suggested that, with the passage of time, the village areas have been slowly cleared through domestic demand for firewood and other purposes. The villages are therefore more open than formerly and less attractive to *Aëdes polynesiensis* which has retreated into the bush. If this is the case then persons living exclusively in the village would be bitten by infected insects at infrequent intervals and this would delay the building up of the quantum of infection to that level at which criteria of filarial disease make their appearance. The result is that they appear 10 years later in the age scale than they did 30 years ago. As women spend more of their time in the village this is probably the main factor accounting for the low incidence in them as well as in the children. Better clothing also constitutes a factor, in that more of the body is covered.

[The results of the work agree in the main with those of the reviewer in Fiji in 1912, although the intensity of filarial infection in this latter group of islands appeared at that time to have been more severe. Should the degree of microfilaraemia be taken as a criterion, then in the New Zealand Mandated Territories or Western Samoa the figures do not differ very materially. Thus, the reviewer's figures show that for Fijians of all age-groups it was 30·4 per cent. for males and 23 per cent. for females among 1,320 persons examined as against 28·9 per cent. and 15·3 per cent. in Opolu out of a total of 955. The assessment of data of this description might be submitted to statistical computation in a comparison between filariasis in Fiji, Savai'i and Opolu in New Zealand Samoa, Tutuila in Eastern [American] Samoa, Tahiti and New Caledonia. This might lead to further interesting conclusions regarding the ecology of Pacific filariasis.

(There are two misprints in the references: " Bird " for " Byrd ", and " Amaut " for " St. Amant ".)] *Philip Manson-Bahr*

Duke, B. O. L. **The Uptake of the Microfilariae of** *Acanthocheilonema streptocerca* **by** *Culicoides grahamii*, **and their Subsequent Development.** *Ann. Trop. Med. & Parasit.* 1954, Dec., v. 48, No. 4, 416–20, 1 fig.

The literature is reviewed on the development of *Acanthocheilonema* (= *Dipetalonema*) *streptocerca* and *D. perstans* in *Culicoides* species.

The distribution of microfilariae of *A. streptocerca* in the skin of a man is shown in a figure; they were confined to neck, shoulders, chest, upper arms and torso and were absent from the forearms and legs. The man showed no microfilariae of *Onchocerca volvulus*, but his blood showed *D. perstans* and *Loa loa*.

Wild *Culicoides grahami* having fed (a) on shoulders and chest and (b) on legs below the knee were collected, maintained for 7 or 8 days, killed, identified and examined for filarial parasites. Other fully fed flies were caught and killed immediately. In addition, 500 wild *C. grahami* were caught, killed, dissected and examined but showed no filarial parasites.

The examination of the smears of the blood meals from both groups of *C. grahami* showed that only from back and chest were microfilariae of *A. streptocerca* taken up by the flies. Of 100 flies fed on a " *streptocerca*-free area " none took up microfilariae of *A. streptocerca*, and no filaria larvae developed in 143 flies fed on the same area of the body and examined 7–8 days after the blood meal. Of flies fed on a " *streptocerca* area ",

43 out of 110 took up microfilariae of *A. streptocerca* and 21 out of 109 showed motile larvae after 7 or 8 days.

The uptake of microfilariae of *D. perstans* and *Loa loa* was about the same from both areas.

These observations show that development of the microfilariae of *A. streptocerca* up to infective forms takes place in *C. grahami* despite the fact that *D. perstans* microfilariae are also taken up from a host infected with both parasites. *H. S. Leeson*

WEBBER, W. A. F. **The Reproductive System of** *Litomosoides carinii*, **a Filarial Parasite of the Cotton Rat. I.—Development of Gonads and Initial Insemination.** *Ann. Trop. Med. & Parasit.* 1954, Dec., v. 48, No. 4, 367–74, 9 figs.

WEBBER, W. A. F. **The Reproductive System of** *Litomosoides carinii*, **a Filarial Parasite of the Cotton Rat. II.—The Frequency of Insemination.** *Ann. Trop. Med. & Parasit.* 1954, Dec., v. 48, No. 4, 375–81, 1 graph.

HAWKING, F. **The Reproductive System of** *Litomosoides carinii*, **a Filarial Parasite of the Cotton Rat. III.—The Number of Microfilariae Produced.** *Ann. Trop. Med. & Parasit.* 1954, Dec., v. 48, No. 4, 382–5, 1 graph.

DUKE, B. O. L. **The Transmission of Loiasis in the Forest-Fringe Area of the British Cameroons.** *Ann. Trop. Med. & Parasit.* 1954, Dec., v. 48, No. 4, 349–55.

These investigations were undertaken during November and December 1953 at Menja, Bamenda Province, British Cameroons. The village lies in the fringe of the rain forest where it merges with the grasslands at 4000–5000 feet above sea-level.

Chrysops silacea and *C. zahrai* [this *Bulletin*, 1953, v. 50, 70] were reported to be abundant in March and to persist throughout the rainy season and disappear in the dry season.

Adults of *Chrysops silacea* were caught in the mornings and *C. zahrai* in the evenings. All flies were offered a blood meal on an African whose blood contained both *Loa loa* and *Dipetalonema perstans*. Only 6 out of 42 *C. silacea* fed; 20 out of 47 *C. zahrai*. Flies which fed were kept and dissected later, others were dissected at once.

The average mean shade temperature for each hour of the 24 was 63·5°F. At this temperature development of *Loa loa* in both flies was considerably delayed. None survived long enough to produce infective forms but at the same rate development would have taken 24 days.

Some of the *C. zahrai* were kept at a higher temperature [unstated] at which development proceeded to the formation of motile forms which migrated to head and proboscis though they were shorter than in *C. silacea*.

The infection rate with *Loa loa* in *C. zahrai* was 6·4 per cent. infected and 4·3 per cent. infective; for *C. silacea* the respective figures were 38·8 per cent. and 16·6 per cent.

The observations suggest that *C. zahrai* may be capable of acting as a vector of *L. loa* but it is probably less efficient than *C. silacea*.

H. S. Leeson

Ikejiani, O. **Studies in Onchocerciasis. (III) The Combined Use of Hetrazan and Antrypol (Suramin B.P.) in the Treatment of African Onchocerciasis.** *West African Med. J.* 1954, Dec., v. 3 (n.s.), No. 4, 166–8, 4 figs. on 2 pls.

Twenty-two cases of onchocerciasis (causing dermatitis) in Nigeria were treated with diethylcarbamazine citrate (Hetrazan) 6 mgm. per kgm. daily for 28 days, and also with suramin intravenously, 1 gm. weekly for 10 doses. To avoid unpleasant reactions, a test dose of 0·2 gm. Suramin was given 24 hours before the first full dose. The patients were ambulant. There were systemic reactions including rash, pyrexia, general aching, pruritus and sometimes enlargement of inguinal lymph glands at the beginning of treatment. They were probably due to the Hetrazan. The skin lesions began to disappear on the fourth day and disappearance was complete in 1½ months. During the next 1½ years only 2 out of the 22 patients had a mild recurrence of pretreatment skin lesions.

Twelve other patients were treated with the same course of Suramin alone. There was no reaction immediate or late. Skin lesions did not vanish completely until 1½ months later. In 2 of the 12 cases skin lesions reappeared after 1½ years. No studies were made of microfilariae by skin snips throughout. [Accordingly this work shows that the recommended treatment (Hetrazan plus Suramin) is well tolerated, but its effects on the worms (although probably good from the patient's point of view) are less certain.] *F. Hawking*

Ikejiani, O. **Studies in Onchocerciasis. (IV) Successful Treatment with Hetrazan of Frequent Abortion in Two Cases of Onchocerciasis.** *West African Med. J.* 1954, Dec., v. 3 (n.s.), No. 4, 169–71, 4 figs. on 2 pls.

Two cases are described of Nigerian women who had extensive dermatitis due to onchocerciasis and who complained of 5 abortions in 10 years and 3 abortions in 7 years respectively. Examination showed no gynaecological reason for these abortions. They were treated with diethylcarbamazine (Hetrazan) in doses of 6 mgm. per kgm. daily for a month and excision of the few onchocercal nodules which were present. One patient became pregnant 4 months after treatment began and the other in 6 months. Treatment with Hetrazan was repeated every 2 months during the second half and the whole of the pregnancy respectively; and it seemed to have no adverse effect. Healthy children were eventually born.

[Further observations are desirable to see whether this association between Hetrazan treatment for women with onchocerciasis and successful pregnancy is significant or merely fortuitous.] *F. Hawking*

Onabamiro, S. D. **The Diurnal Migration of Cyclops infected with the Larvae of *Dracunculus medinensis* (Linnaeus), with some Observations on the Development of the Larval Worms.** *West African Med. J.* 1954, Dec., v. 3 (n.s.), No. 4, 180–94, 5 figs.

In a previous paper [this *Bulletin*, 1951, v. 48, 1032] the author showed that in south-west Nigeria *Thermocyclops nigeriensis* is the most important intermediate host of *D. medinensis*. In a later paper [this *Bulletin*, 1953, v. 50, 54] he drew attention to the fact that in naturally infected pools *T. nigeriensis* exhibited a diurnal migration. Thus at 6 a.m. the greatest

concentration of cyclops was at the bottom of the pond, while the smallest numbers occurred near the surface; at mid-day there was evidence that these cyclops had migrated both from the surface and from the bottom so that by 6 p.m. the greatest concentration occurred about midway between the surface and the bottom.

In the present paper the author describes the results of similar observations carried out on the same species of cyclops after these had been exposed to heavy infestation with *D. medinensis*. Since it proved impossible to carry out the experiment in a naturally infected pond, the author constructed a tank measuring 16 ft. × 4 ft.; the bottom of the tank was sloped so that the water stood at a height of 4 ft. 2 inches at the deep end and 2 ft. at the shallow end. The bottom of the tank was covered with mud transferred from a neighbouring pool, and screens were erected to provide shade similar to that occurring in nature. Finally, a mosquito-proof cage was erected over the tank and the screens. The water in the tank was allowed to settle and, after algal growth had been added, it was stocked with large numbers of cyclops, mainly *T. nigeriensis*, collected from pools in the area. Daily records were taken at 5.30 a.m., 1 p.m. and 7 p.m. and these showed that the temperature of the water varied very little during the course of cold mornings and hot afternoons and between different levels in the water at any given time. Observations on the cyclops colony in the tank confirmed the previous observations recording the diurnal migration in the vertical but in addition it was observed that there was a horizontal migration.

When the colony of *T. nigeriensis* was well established " vast quantities of guinea-worm larvae " were emptied into the tank and two days later (the time required for hyper-infected cyclops to die off) readings were started. " In the first five days after infection those cyclops moderately infected with *Dracunculus* larvae appeared to be as active in their movements as those which were not infected. From the sixth day to the 14th day infected cyclops became less and less active until by the 14th day after the infection they became practically incapable of moving more than a few inches from the bottom of the tank ". (These results are shown in considerable detail in tabular form.)

The author's conclusion regarding the mode of infection in Nigerian villages is sufficiently interesting to be quoted in full.

" Reasoning thus, we can divide the annual life of the village pond in Nigeria into two phases: when the pond is full of water following the onset of the rainy season and has a low infectivity; and when it has very little water, as in the latter part of the dry season and has a high infectivity.

" In the former phase the number of infective cyclops per unit volume of water would be relatively small, and such as there are would be around the margin of the pond and at the bottom. Water taken from the surface near the middle of the pond would be relatively safe to drink. It so happens, however, that for fear of drowning, village folks do not, as a rule, go inside a large pond full of water but just squat at the edge and fill up their pots from the margin.

" In the dry season, when the level of the water in the pond is very low, nothing would save one from the risk of infection, for it is often necessary to scoop the water with a small bowl from the bottom of the pond into the pot. Even at an intermediate period when the pond water, though still plenty, has started to recede from the margin, water carriers wading a few feet inside invariably stir up the bottom with their feet with the probable result that sluggish cyclops containing *Dracunculus* larvae which are already in the 3rd stage and, as such, are infective to man, would be

thrown up and carried with the water home. It is, in fact, very probable that the majority of human infections in Nigeria occur in this manner."

R. M. Gordon

Pizzi, T. & Schenone, H. Hallazgo de huevos de *Trichuris trichiura* en contenido intestinal de un cuerpo arqueológico incaico. [**Finding of *Trichuris trichiura* Eggs in the Intestinal Content of an Archeologic Body of an Inca**] *Bol. Chileno de Parasit.* 1954, July–Sept., v. 9, No. 3, 73–5, 1 fig.

The English summary appended to the paper is as follows:—

"The frozen body of an Inca child was found on a mountain near Santiago, at 5,400 meters (17,658 feet) above sea level, buried in a small stone building. The body was exceptionally well preserved and its antiquity has been calculated in about 450 years.

"A parasitological study was performed from faeces obtained from the rectum. Abundant eggs of *Trichuris trichiura* were found with quite normal appearance. This finding seems to prove that this nematode was present in the Inca population prior to the Spanish conquest and the hypothesis, that *T. trichiura* may be originally from America, being later transported to the old world, is raised."

Luengo, M. & Rodríguez, H. Presencia y cantidad de infección triquinósica en los músculos pilar carnoso del diafragma, maseteros, faríngeos e intercostales del cerdo. [**Presence and Amount of *Trichinella spiralis* Infection in Muscle of the Pillars of the Diaphragm, Masseter, Pharynx and Intercostals of the Pig**] *Bol. Chileno de Parasit.* 1954, July–Sept., v. 9, No. 3, 82–4.

The English summary appended to the paper is as follows:—

"The authors have performed examination of 100 trichinous hogs, using the phototrichinoscope and examining eight slides of compressed muscles of each pig. To the routinely examined muscle in the slaughterhouse of Santiago, i.e. pillars of diaphragm, they added the masseters, the muscles of the pharynx and the intercostalis.

"They show the incapsulated larvae of *Trichinella spiralis* in the following percentages: pillars of the diaphragm 35·12%; masseters 30·25%; muscles of the pharynx 26·95% and intercostalis muscles 7·68%.

"The amount of incapsulated larvae of *Trichinella* was greater in the second slide and if they examine four slides, the probability of finding the larvae of *Trichinella* was 50·1% and with eight slides, 100%. They conclude the necessity of examining eight slides for each pork in every slaughterhouse and the use of the phototrichinoscope as routine technique of examination."

Boyd, Elizabeth M. & Huston, E. Jane. **The Distribution, Longevity and Sex Ratio of *Trichinella spiralis* in Hamsters following an Initial Infection.** *J. Parasitology.* 1954, Dec., v. 40, No. 6, 686–90.

"1. Seventy two male golden hamsters, approximately 120 days old, were infected with *T. spiralis*; 24 with 100 ± 5 larvae (series I); 48 with 500 ± 5 larvae (series II). Three animals of series I and 6 of series II were sacrificed at periods of 1, 2 and 24 hours, 6 and 15 days, 3, 4 and 5 weeks following the initial dose.

"2. Many of the *Trichinella* had entered the small intestine by the end of the 1st hour and were penetrating its mucosa by the end of the

2nd hour period. The maximum number of adult worms was recovered during the 1st day. In hamsters receiving the larger dose, the *Trichinella* were eliminated in proportionately greater numbers but they survived for a longer period. Thus in series I and II, respectively, 23·0 percent and 11·8 percent had survived by the 6th day, and 0·0 percent and 1·2 percent by the 15th day.

"3. The sex ratio of the adult worms was 1·8:1 F/M. Males were eliminated more rapidly from the hosts than the female worms.

"4. The number of encysted larvae in the hosts of series I represented a 29·8:1 and a 36·2:1 ratio of larvae to dosage at the 15th day and 5th week. In series II, however, the ratios were 110·3:1 and 124·9:1 for the same periods of infection."

DEFICIENCY DISEASES

Remy, F. & Charlot, Y. Étude sur la nutrition des enfants marocains d'âge scolaire. [**Study of the Nutrition of Moroccan Children of School Age**] *Bull. Inst. Hyg. Maroc.* 1953, v. 13, Nos. 3/4, 213–28, 2 charts.

Lipparoni, E. Ulteriore contributo allo studio dei problemi relativi all'alimentazione dei somali. (Nota.) [**Further Studies on the Dietary Problems of Somalis**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, June & July, v. 35, Nos. 6 & 7, 285–321; 349–71. [54 refs.] English summary.

See also this *Bulletin*, 1951, v. 48, 578; 1955, v. 52, 191.

Chowdhury, S. R., Rajagopal, K. & Chakraborty, A. N. **Influence of Pyridoxine on Fat Metabolism in Phrynoderma.** *Indian Med. Gaz.* 1954, May, v. 89, No. 5, 283–7. [10 refs.]

Patients with phrynoderma showed some improvement when given ¾ oz. of linseed oil daily for 8 weeks. If, in addition, 50 mgm. of pyridoxine were injected intramuscularly twice a week, there was good recovery. Pyridoxine by itself had no effect.

A lipid analysis was made of the sera of the 24 patients who took part in the trial. The combination of linseed oil by mouth and intramuscular pyridoxine raised the iodine number of the serum fatty acids from 98 to 120. Pyridoxine alone had no effect on the iodine number, and linseed oil a smaller effect not statistically significant (but the number of cases was small).

These results are consistent with the view that phrynoderma is a condition due to deficiency of essential fatty acids and that pyridoxine plays an important part in the utilization of fatty acids by the body. *R. Passmore*

Singh, A. **Infantile Scurvy in the Punjab.** *Indian Med. Gaz.* 1954, May, v. 89, No. 5, 288–9.

In 5 years the author has seen 16 cases of infantile scurvy in the Punjab. Adult scurvy was very rare. The children were nearly all between 1 and 2 years old, and all came from very poor families. The mothers were mostly undernourished and had stopped suckling their children at the age of 4 to 5

months. Most of the children were on cow's milk: none received any form of fruit juice.

Clinical diagnosis was usually not difficult and pain and swelling of extremities in a child of 1–2 years of age should always lead to suspicion of the disease. Daily injections of up to 200 mgm. of ascorbic acid rapidly relieved the symptoms. *R. Passmore*

Trowell *et al.*, **Kwashiorkor.**

This book is reviewed on p. 496.

HAEMATOLOGY

Wright, C. S., Mabry, D. S., Carr, R. D. & Perry, Anna M. **Survey of the 1953 Hematology Literature.** *Arch. Intern. Med.* 1954, Oct., Nov. & Dec., v. 94, Nos. 4, 5 & 6 (Sect. 1), 648–78; 806–45; 995–1036, 3 figs. [1109 refs.]

See also p. 384, Lumme *et al.*, **Uropepsin Excretion in Pernicious Tapeworm Anemia.**

Tiagi, G. K., Haldar, P. K. & Laha, P. N. **Cooley's Anemia in India. With Illustrative Case Reports.** *Indian J. Med. Sci.* 1954, Nov., v. 8, No. 11, 745–59, 4 figs. (3 on pl.). [15 refs.]

Four cases of Mediterranean anaemia were discovered in Agra. They were of the thalassaemia major type and showed target cells, decreased osmotic fragility and a tendency to occur in families. In addition to these 4 cases a number of others were seen which showed thalassaemia minor judged from the appearance of target cells. The 5 families investigated belonged originally to the Punjab. The diagnosis has been made largely by exclusion of other anaemias such as familial haemolytic anaemia, sickle-cell anaemia, pernicious anaemia and so forth. [One feels that examination for abnormal haemoglobins, the finding of foetal haemoglobin and the exclusion of haemoglobin C would have put the diagnosis on a yet firmer basis.] *H. Lehmann*

Budtz-Olsen, O. E. & Burgers, A. C. J. **The Sickle-Cell Trait in the South African Bantu.** *South African Med. J.* 1955, Jan. 29, v. 29, No. 5, 109–10.

The South African workers have repeatedly remarked on the interesting fact that the Zambesi river seems to have acted as a barrier against the spread of the sickling gene in Africa. Nearly 6,000 South Africans (Bantu, Cape Coloured, Bushmen) have now been surveyed and the incidence of the sickle-cell trait varied from 0–2 per cent. in these groups. To these is now added a small group from the Ciskei. Finger tip blood from 89 Bantu (Nguni 76, Sotho-Tswana 12, Bavenda 1) was examined. No sickle cells were found. The sickle-cell trait is therefore virtually absent in the Union of South Africa and the authors point out that this fact cannot be explained

on the basis that the gene for haemoglobin S survives only in areas where malaria is endemic, since malaria has certainly been present for many generations in Zululand [see also this *Bulletin*, 1954, v. 51, 1221].

H. Lehmann

Brain, P.; Lehmann, H. **Incidence of Haemoglobin C in the ' Coloured ' Population of Cape Town.** [Correspondence.] *Nature.* 1955, Feb. 5, v. 175, 262–3, 1 fig.

The " coloured " population of Cape Town is derived from European, Hottentot, Bantu and Malay elements. In the 17th century slaves from West Africa were also imported into the Cape settlement. It is known that sickling is present, though at a very low frequency (0·6 per cent.). On examination of 219 blood specimens by paper electrophoresis 2 haemoglobin samples were discovered which were similar in mobility to haemoglobin C. Haemoglobin E has a very similar mobility to C under the conditions of this investigation. As E has been found in Siam and Ceylon, it was important to exclude the possibility of the abnormal haemoglobin being not C but E—possibly derived from Malaya. Haemoglobin E was made available by the St. Louis group (who had discovered it in Siam), and it was then possible to establish that the pigment discovered in the 2 Cape " coloureds " was truly identical with haemoglobin C in its mobility.

H. Lehmann

Ranney, Helen M. **Observations on the Inheritance of Sickle-Cell Hemoglobin and Hemoglobin C.** *J. Clin. Investigation.* 1954, Dec., v. 33, No. 12, 1634–41, 2 figs. [12 refs.]

" Observations on a total of ten families in which C and S hemoglobin occurred indicate that the genes for sickle and C hemoglobin segregate as simple Mendelian dominants.

" Five offspring of three marriages of individuals with sickle-cell-hemoglobin C disease to individuals with normal hemoglobin were found to have either sickle-cell trait or hemoglobin C trait. This supports the hypothesis that the genes for C and sickle hemoglobin are alleles.

" Observations on three offspring of individuals with sickle-cell-hemoglobin C disease and marital partners heterozygous for an abnormal hemoglobin were consistent with allelism of the genes for sickle and C hemoglobin.

" The fact that individuals with sickle-cell-hemoglobin C disease do not have any appreciable amount of normal adult hemoglobin is interpreted as evidence favoring allelism of the genes rather than linkage or independence.

" Two additional cases of hemoglobin C disease, *i.e.*, homozygosity for the gene for hemoglobin C, were described."

Morgan, J. L., Bowles, R. M. & Harris, J. S. **Hemoglobin C. Report of the Homozygous Condition and of Combinations with Normal and Sickle Cell Hemoglobin.** *Pediatrics.* Springfield, Ill. 1955, Feb., v. 15, No. 2, 185–90, 3 figs. [11 refs.]

" Two families showing abnormal hemoglobin types are described. One case represents the fifth reported instance of homozygous C disease. The

clinical picture is discussed, and the importance of electrophoresis in making a definitive diagnosis is stressed."

VENOMS AND ANTIVENENES

Muić, N. & Piantanida, M. Zur Kenntnis des Sandottergiftes: Elektrophoretische und chemische Charakterisierung der Hauptfraktionen. [**Electrophoretic and Chemical Characters of the Principal Fraction in the Venom of** *V. ammodytes*] *Hoppe-Seyler's Ztschr. physiol. Chem.* 1955, v. 299, Nos. 1/2, 6–14, 5 figs. [Refs. in footnotes.]

The English summary appended to the paper is as follows:—

"The proteins of the venom of *Vip. ammodytes* L. have been separated by precipitation under isoelectric conditions. Several fractions were isolated: one was chemically almost pure but only feebly toxic; another, which was not homogeneous, had a high potency, and was evidently the poisonous principle in an impure state.

"Six or seven protein components in the venom could be distinguished by their different electrophoretic mobilities on paper.

"The amino-acid compositions of the venom and of several of its toxic fractions were determined by paper chromatography."

Kuwajima, Y. **Immunological Researches on the Main Formosan Poisonous Snakes, especially on the Venoms. VI. Natural Immunity of** *Naja naja atra*. *Japanese J. Exper. Med.* 1953, Dec., v. 23, No. 6, 465–71.

"It seems reasonable to consider that the neutralizing properties of the cobra muscle extract for the venoms of Naja naja atra, Bungarus multicinctus and Vipera russellii was not due to the presence of antivenin in the extract. It needed the heating of the extract-venom mixture at 58°C. for 30 minutes. Moreover, a strict specificity between venom and antivenin was not recognized in this case. Consequently it is likely that this substance is an enzyme-like substance. But it needed further investigation to determine it. In order to detoxify the venom, it was a prerequisite that the venom-antivenin mixture was heated at 58°C. for 30 minutes. On the other hand, the fact that a prophylactic action against the inoculation of venom on guinea pigs was recognized weakly without previous heating of the extract-venom mixture suggests that this neutralizing principle in the muscle may be playing a role in the establishment of the innate immunity."

Taylor, E. H. **Further Studies on the Serpents of Costa Rica.** *Univ. Kansas Sci. Bull.* 1954, July 15, v. 36, Pt. 2, 673–800, 40 figs. [Numerous refs.]

Schenone, H., Bertín, V. & Mann, G. Un nuevo caso de ofidismo. [**A New Case of Snake Bite**] *Bol. Chileno de Parasit.* 1954, July–Sept., v. 9, No. 3, 88–9, 3 figs.

The English summary appended to the paper is as follows:—

"One case of snake-bite by one species which is currently considered harmless, *Leimadophis chamissonis*, is reported. A 25 years old male was

bitten in the right arm and rapidly a painful edema developed, which reached the axillary region, accompanied by ecchymosis and systemic involvement. The clinical picture was very efficiently relieved by cortisone therapy at a dosage of 100 mg. daily.

"This case seems to prove the poisonous action of this species of snake. The rarity of accidents in our country may be explained by the special location of the poisonous fang which is at the back of the maxilae (opisthoglypha)."

Cicardo, V. H. L'hypertension artérielle produite par le venin de *Latrodectus mactans*. [**Arterial Hypertension produced by the Venom of** *Latrodectus mactans*] *C.R. Soc. Biol.* 1954, Oct., v. 148, Nos. 19/20, 1647–8.

TOXOPLASMOSIS

Pulvertaft, R. J. V., Valentine, J. C. & Lane, W. F. **The Behaviour of** *Toxoplasma gondii* **on Serum-Agar Culture.** *Parasitology.* 1954, Nov., v. 44, Nos. 3/4, 478–84, 6 figs. on pl.

The authors give an account of the behaviour of *Toxoplasma gondii* as observed *in vitro* on serum-agar cultures. The medium consists of solidified serum, prepared by adding 1 cc. of 3 per cent. agar in distilled water to 3 cc. of serum, and pouring the mixture into a 5 cm. Petri dish, after which small cubes of the medium are cut out and placed on slides. The parasites and host-cells are then transferred to the agar, a coverslip is applied to the surface, and its sides are sealed with wax. Cultures are examined microscopically, the microscope being mounted in a Perspex incubator at 37°C. in the case of human cells and at 39°C. in the case of murine cells. The strain of *Toxoplasma* used was the first one to be isolated in England [this *Bulletin*, 1954, v. 51, 634]. For these experiments the inoculum was obtained from the peritoneal exudate of an infected mouse. It was mixed on the agar blocks with cells of the following origin: macrophages from murine peritoneum, murine or human bone-marrow, human lymph gland, rabbit leucocytes, mouse lung, S37 (mouse ascites tumour).

Observations on the structure and behaviour of the living parasites were made by phase contrast microscopy. Within the host cell the parasites are rigid and motionless; they multiply there exclusively by longitudinal binary fission. When the host cell is filled with parasites it ruptures, releasing them. In the outside medium the parasites move, with the pointed end directed forwards, proceeding "in porpoise-like undulations". The parasites then enter new host cells in two ways: either by penetrating into them actively, or by being phagocytosed. According to the authors, in the former case—which they call the "toxic phase"—the parasite does not multiply and the host cell dies, while in the latter case—called the "reproductive phase"—the parasite settles down and multiplies. Since many infected cells show evidence of mitosis, it is thought that the parasite either selects such cells or it stimulates this process.

The appearance of the parasites in the preparations is shown in a series of photomicrographs. *C. A. Hoare*

Weinman, D. & Chandler, Anne H. **Toxoplasmosis in Swine and Rodents. Reciprocal Oral Infection and Potential Human Hazard.** *Proc. Soc. Exper. Biol. & Med.* 1954, Oct., v. 87, No. 1, 211–16. [12 refs.]

Rat brains, organs of mice and other tissues infected with *Toxoplasma* were given by mouth to 7 pigs; 3 developed toxoplasmosis and the organisms could be isolated from the brain or blood. Seven other pigs were infected with 10^7–10^8 organisms by intraperitoneal or intracardiac injection; the dye test titre rose to 256 or higher in 5 pigs and the organisms were isolated from the blood or tissues of 2 of 3 animals investigated. In one animal the organisms were recovered 41 days after infection. Dye test titres of 64 and 256 were found in 2 pigs which had been reared in pens overrun with rats. It was also possible to demonstrate infection of albino rats after the inoculation of *Toxoplasma* or the administration of infectious tissues by mouth.

The results are in agreement with the hypothesis that toxoplasmosis can be contracted by eating pork, and that pigs acquire the disease from infected rodents. *D. J. Bauer*

Awad, F. I. **The Diagnosis of Toxoplasmosis. Lack of Specificity of Sabin-Feldman Dye Test.** *Lancet.* 1954, Nov. 20, 1055–6. [10 refs.]

The Sabin and Feldman dye test is now widely used throughout the world for the diagnosis of toxoplasmosis, and positive reactions are accepted as evidence of infection. In cases when positive serological findings cannot be confirmed parasitologically, it was thought that the persons and animals in question had been previously infected with *Toxoplasma*. However, a number of observers have cast doubt on the specificity of the dye test, since it has also given positive results with such unrelated parasites as *Sarcocystis* and *Trichomonas vaginalis* [this *Bulletin*, 1952, v. 49, 322; 1955, v. 52, 84, 294] [as well as with *Trypanosoma lewisi*].

In the present paper the author reports the results of an investigation on cross-reaction in the toxoplasmic dye test with *Trichomonas vaginalis* and *Trypanosoma cruzi*, in laboratory animals known to have had no contact with *Toxoplasma gondii*. It was found that the sera of mice and rabbits immunized against the trichomonad, on the one hand, and those of mice recovered from the trypanosome infection, on the other, gave positive reactions with toxoplasms in the dye test, whereas the sera of corresponding control animals gave negative results. In the author's words: "This work has clearly demonstrated the lack of specificity of the Sabin-Feldman dye test in the diagnosis of toxoplasmosis". *C. A. Hoare*

Kudicke, H. & Pöhlig, W. Erfahrungen und statistische Betrachtungen über den Serofarbtest nach Sabin und Feldman. [**Experiments and Statistical Consideration relating to Sabin and Feldman's Dye Test**] *Ztschr. f. Hyg. u. Infektionskr.* 1954, v. 140, No. 4, 350–71, 5 figs. [36 refs.]

The authors record the results of toxoplasmic dye tests carried out as a routine between 1951 and 1953 with the sera of patients submitted for examination by clinics, hospitals and private practitioners in Lower Saxony. The material belonged to unselected cases, the nature of which was usually unknown to the authors before the tests were completed, when it was revealed that the 3,428 samples of sera used comprised cases of eye diseases,

tuberculosis, suspected toxoplasmosis, or simply "headaches", as well as sera sent for Wassermann and Widal tests, for the diagnosis of leptospirosis and for the determination of the Rhesus factor.

During the first period of this investigation the sera were titrated in dilutions of 1 in 12, 1 in 36, 1 in 72, etc., during the second period the titres were 1 in 4, 1 in 16, 1 in 64, etc. The results of the survey were treated statistically. It was found that the proportion of positively reacting sera rose with the age of the patients, irrespective of their sex, reaching 65·7 and 71·4 per cent. by the two methods respectively, while in infants up to the age of one year the corresponding figures were 50·0 and 55·6 per cent. The incidence of positive dye-test reactions was particularly high in females. Among the persons examined for syphilis and in those suffering from headaches positive reactions to the dye test were about 20 per cent. more frequent than in all the other groups.

It is concluded that, in view of the high proportion of positive reactions with sera from a variety of conditions, the dye test cannot be relied upon for the diagnosis of toxoplasmosis, unless it is supported by clinical evidence.

C. A. Hoare

DERMATOLOGY AND FUNGUS DISEASES

Garb, J. & Miller, Otis B. **Mycosis Fungoides, Tumor Stage, coexistent with Disseminated Coccidioidomycosis.** *Arch. Dermat.* 1955, Jan., v. 71, No. 1, 59–65, 4 figs. [12 refs.]

Piper, W. N. & Goldblum, R. W. **Two Treatment Failures using Diethylstilbestrol in Treatment of Coccidioidomycosis.** *Arch. Dermat. & Syph.* 1954, Dec., v. 70, No. 6, Sect. 1, 809–12, 3 figs.

"Two patients with cutaneous coccidioidomycosis were treated with daily intramuscular injections of diethylstilbestrol for 63 to 100 days, with no effect on the lesions. They developed gynecomastia and decreased libido, which was no severer than with more conventional doses. The markedly decreased sperm counts following therapy should limit the administration of large doses of diethylstilbestrol to serious diseases."

Schwarz, J. & Goldman, L. **Epidemiologic Study of North American Blastomycosis.** *Arch. Dermat.* 1955, Jan., v. 71, No. 1, 84–8, 1 map.

To obtain data bearing on the epidemiology of North American blastomycosis, the authors circulated a questionnaire among dermatologists and chest surgeons in various parts of the United States, asking for particulars of all cases of the disease under treatment during the 6-month period from January to June, inclusive, 1953. Replies were received from 1,160 dermatologists and 209 surgeons reporting respectively 81 and 20 cases of the disease.

Data on the geographical distribution of the cases showed that the main area of the disease corresponded rather roughly with that of histoplasmosis in the central-eastern part of the country, with isolated cases in other parts. Male patients outnumbered females in the proportion of 8 to 1 and the disease was found in patients in age-groups up to the 80–89 years group,

which contained 3 cases. Only one patient was under the age of 20 and the great majority fell into the age-groups between 30 and 60 years.

There was no evident seasonal incidence of the infection, and no racial influence, although white patients numbered 86 and coloured patients only 15. Occupation had no definite bearing on the disease but 46 of the patients were engaged in " dusty " employments which included farm work, labouring, construction, carpentry and mining.

The disease was essentially chronic, some of the case histories going back as far as 17 years, and, although 52 of the cases were classified as generalized blastomycosis, there were only 3 deaths. In 21 cases there was pulmonary disease without skin lesions and in 69 cases there were skin lesions; these were single in 21 cases and multiple and variously distributed in 48. It is noteworthy that when the cutaneous lesions occurred on one side of the body only, this was more frequently the right side than the left.

Of the treatments employed, pneumonectomy was performed in 2 cases and lobectomy in 10, which emphasizes the importance of the pulmonary disease. In chemotherapy, stilbamidine and 2-hydroxystilbamidine have largely replaced potassium iodide, but, although rapid clinical improvement is often obtained from the use of these diamidines, reports of recurrences are frequent. *J. T. Duncan*

Wilson, J. W., Cawley, E. P., Weidman, F. D. & Gilmer, W. S. **Primary Cutaneous North American Blastomycosis.** *Arch. Dermat.* 1955, Jan., v. 71, No. 1, 39–45, 3 figs.

Originally, North American blastomycosis was considered to be primarily a cutaneous disease with, occasionally, extension to the deeper organs, but in more recent times, from increasing observation and on analogy with histoplasmosis and coccidioidomycosis, the conviction has developed that the usual primary site of blastomycosis is in the lung and that the dermal lesions are almost invariably due to secondary dissemination of the infection. Opinion is, however, divided on the possibility that a primary dermal infection may account for those instances in which the disease appears to be confined to the skin and is sometimes represented by a solitary verrucose lesion of characteristic appearance and marked chronicity.

The present authors describe 4 well authenticated cases of primary dermal blastomycosis, in 3 of which the infection was contracted accidentally through a punctured wound or a cut on the finger during necropsies on cases of systemic blastomycosis; the fourth instance was a laboratory infection of a similar kind. These 4 cases, which appear to be the only instances of this mode of infection on record, presented a common syndrome by which they were sharply distinguished from supposed cases of primary cutaneous blastomycosis. The distinguishing features were the development of a primary lesion or chancre in the site of inoculation after an incubation period of 7 days or longer, followed by an ascending lymphangitis in which the course of the lymphatic vessels may be marked by series of nodular enlargements recalling an appearance seen in sporotrichosis, and lymphadenopathy affecting one or more of the regional lymph nodes, in the present cases chiefly the axillary group. The disease was of benign character, relieved by surgical treatment and responding well to chemotherapy or healing spontaneously. The chancre was not granulomatous but consisted of an inflammatory infiltrate chiefly of polymorphonuclear cells and lymphocytes among which numerous budding *Blastomyces dermatitidis* were seen. It contrasted strongly with the common cutaneous lesion of blastomycosis

which usually consists of a verrucose plaque with a raised, pustular, violaceous border and a healing and cicatrizing centre. Microscopically, this lesion presents a picture of marked acanthosis sometimes amounting to " pseudoepitheliomatous hyperplasia ", and a granulomatous infiltration of the cutis in which *B. dermatitidis* is often scanty. There is no associated lymphangitis or lymphadenopathy.

The immunological reactions and the prognosis appear to be more favourable in the chancroid type of disease than in the common blastomycosis with dermal lesions.

Accepting the syndrome associated with the 4 accidental infections as characteristic of primary cutaneous blastomycosis, the authors consider that this form of the disease is extremely rare if, indeed, apart from the 4 cases, it has ever been recorded. *J. T. Duncan*

HEAT STROKE AND ALLIED CONDITIONS

D'Avanzo, G. Influenza del clima tropico-equatoriale sulla glicemia, polso, pressione arteriosa e temperatura corporea durante la navigazione transoceanica. [**The Effect of Tropical Climatic Conditions on Blood Glucose, Pulse Rate, Blood Pressure and Body Temperature while at Sea**] *Med. d. Lavoro.* 1954, June–July, v. 45, Nos. 6/7, 392–404. [31 refs.] English summary (9 lines).

The author, serving as a ship surgeon of the motorship *Ugolino Vivaldi*, carried out observations on 60 persons, including passengers, ship's officers and crew, in the course of a voyage between Italy and South America. The vessel left Naples on the 14th May, 1952 and arrived at Buenos Aires on 2nd June. The observations were made at 3 separate periods, namely, (a) on May 16–18, when the ship's position was between latitudes 37° and 31°N., (b) on May 23–25, when the ship was crossing from 5°N. to 5°S., within the equatorial belt, and (c) on May 30 and 31, between 25° and 33°S., after leaving the tropics at 23°S. The author gives details of longitude, average atmospheric temperature and pressure, and average relative humidity for each of the 3 periods.

Each person was examined on all 3 occasions under identical conditions, between 7 and 9 a.m., while still at rest and fasting.

The author discusses the mechanism of climatic and meteorological characteristics of tropical latitudes and refers briefly to the technique which he has followed for his observations. He tabulates the particulars and his own findings for each individual, the figures being averages from 3 successive readings.

These observations have confirmed that while pulse rate and body temperature show a slight rise, blood pressure and blood glucose show a drop under tropical conditions. The author links these changes with the well-known fall in basal metabolism which has been repeatedly reported under similar conditions and he thinks that all these changes indicate a chemical process of body temperature control under vagotonic action and represents an adaptation to the environmental change. *J. Cauchi*

MISCELLANEOUS DISEASES

HARRIES, J. R. **A Case of Onyalai in a Male Taita showing Diminution or Absence of Megakaryocytes.** *East African Med. J.* 1954, Dec., v. 31, No. 12, 557–9.

The patient aged 27 gave a history of bleeding for a week from the gums and lips, preceded by epigastric pain. He showed no signs of avitaminosis. His gums were bleeding and a dark blood blister was seen on his tongue and another on the right buccal mucosa. Later another blister appeared on the tongue and he developed a purpuric rash over the extremities and the back of the chest. Haematuria also developed. The capillary resistance test was positive. He was treated with vitamins C and K and recovered, leaving hospital about two weeks after admission.

The significant blood findings were a platelet count of 9000 per cmm., a bleeding time of 21 minutes and the absence of megakaryocytes in sternal marrow smears.

This would appear to be the fourth case of onyalai recorded from Kenya. The author suggests that the causative factor depressed the formation of the megakaryocytes and that the lack of evidence of any exogenous toxin indicates that the cause was endogenous. *M. Gelfand*

WILKINSON, J. **The Diagnosis of Onyalai.** *East African Med. J.* 1954, Dec., v. 31, No. 12, 549–56. [15 refs.]

The author has made a deep study of onyalai [this *Bulletin*, 1953, v. 50, 977] in a country where it is a comparatively rare disease. He has thus rendered a valuable service to the profession in Africa by drawing attention to this interesting African condition which may yet prove to have a wider distribution than is known at present.

He discusses the diagnostic features of onyalai under three main headings:—

(1) *The case details*

With a few exceptions the disease is confined to the Bantu and has only occasionally been recorded in other races. Males are more often affected than females and whereas the condition may occur at any age, it is mostly seen between the ages of 20 and 40 years.

(2) *The clinical picture*

The essential features are the black or reddish blisters of varying size and number on the tongue, buccal mucosa, lips and less frequently on the skin, and bleeding from the nose, mouth and occasionally from the urinary tract, bowels and in the female from the vagina. On careful inspection of the skin purpuric spots are commonly seen and are sometimes present in the conjunctivae.

(3) *The clinical pathology*

The characteristic feature is the prolonged bleeding time due to a thrombocytopenia which is mostly severe. The clot is soft and does not retract normally although the clotting time is normal. Increased capillary fragility is not constantly present and the prothrombin time is normal.

The chief diseases which may resemble onyalai are:—Werlhof's purpura (idiopathic thrombocytopenia) in which blood blisters do not occur; secondary thrombocytopenic purpura, especially that following arsenotherapy when haemorrhagic bullae are often seen in the oral cavity; scurvy which is recognized by the evidence of dietetic deficiency, the typical changes in

the gums, the rash and haemorrhages into typical sites; snake bite, especially following a puff adder bite.

In his classification of onyalai, Wilkinson prefers to distinguish two main types—mild and severe—rather than the more detailed classification hitherto suggested, with mild, severe, mild—passing to—severe, cerebral, chronic and relapsing types. *M. Gelfand*

Daniel, M., Petrů, M., Seidler, L. & Svatý, J. Beitrag zur Lungenakariasis des Menschen. [**Lung Acariasis in Human Beings**] *Zent. f. Bakt.* I. Abt. Orig. 1955, Jan., v. 162, Nos. 1/2, 136–45, 1 fig. [23 refs.]

The English summary appended to the paper is as follows:—

"The authors report on a rare case of mite-finding in the sputum of a patient which was simultaneously affected by a pulmonary and probably also a cerebral paragonimiasis. The mites detected in the sputum by microscope and the high eosinophilia are the leading symptoms which help us to make the correct diagnosis. Because of the ubiquitous distribution of the mites the possibility of other cases of pulmonary acariasis is pointed to."

PARASITOLOGY: GENERAL

Neghme, A., Silva, R. & Sotomayor, R. Enteroparasitosis entre escolares de la provincia de Santiago. [**Intestinal Parasitic Infections in School-children of the Province of Santiago**] *Bol. Chileno de Parasit.* 1954, July–Sept., v. 9, No. 3, 70–73.

The English summary appended to the paper is as follows:—

"The authors report the results of some enteroparasitic investigations performed in school-children of the province of Santiago.

"In 3,902 pupils, the infection rates of *Entamoeba histolytica*, *Giardia lamblia* [*intestinalis*], *Ascaris lumbricoides* and *Hymenolepis nana* were 25·73; 15·73; 27·37 and 15·76 per cent, respectively. These rates are considered far superior to those observed in home investigations of other groups of children of the same age. In general, the infection rates in school-children are higher than those observed in the people surveyed at random in the central Zone of the country.

"Investigations on oxyuriasis, by the Graham method, were made in 2,861 children from the surveyed group, revealing an infection rate of 36·48 per cent.

"Students of Medicine, of the third year of the Medical Faculty, University of Chile, together with the teachers of the elementary schools, actively participated in performing health education activities in the school and in the home of the school-children. The authors point out the importance of health education in the home and in the community with the objectives of improving personal hygiene, of preventing parasitic diseases and of promoting better health."

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Bishopp, F. C., Stage, H. H. & Sollers, Helen. **World Accomplishments in Mosquito Work in 1953.** *Proc. Forty-First Ann. Meeting New Jersey Mosquito Extermination Ass. & Tenth Ann. Meeting Amer. Mosquito Control Ass.* Atlantic City, N.J. 1954, Mar. 9–12, 13–40.

Wallis, R. C. **A Study of Oviposition Activity of Mosquitoes.** *Amer. J. Hyg.* 1954, Sept., v. 60, No. 2, 135–68, 2 figs. [58 refs.]

This is a laboratory study of the ability of 10 species of mosquitoes to distinguish between fresh water and waters of varying saline content. Also described are experiments to localize the sensory areas on the mosquito which may be involved in this selection.

An account of the characteristic behaviour of egg-laying females of each species is given and the number of eggs deposited is used as the criterion of measurement of oviposition reaction.

In a preliminary test, groups of each of the 10 species were offered sodium chloride solutions ranging from 0 to 6 per cent., *i.e.*, from 0 to 60 gm. per litre. *Anopheles quadrimaculatus*, *A. freeborni* and *A. aztecus* laid eggs in solutions up to 4 per cent., the remainder laid very few eggs in anything over 1 per cent. solutions. Of the 4 species of *Culex* used —*C. salinarius*, *C. pipiens*, *C. molestus* and *C. fatigans*—*C. salinarius*, a species found breeding naturally in fresh or brackish water, showed the widest salinity tolerance. *Aëdes polynesiensis* and *Aëdes aegypti* showed a preference for 0·25 per cent. sodium chloride and *Aëdes pseudoscutellaris* for distilled water.

Experiments to localize the sensory areas responsible indicate that these are distributed on the tarsi of all 6 legs. It is suggested that certain thin-walled spines observed on the tarsi may be the sense-organs concerned.

Anne Hudson

Nielsen, E. T. & Haeger, J. S. **Pupation and Emergence in *Aëdes taeniorhynchus* (Wied.).** *Bull. Entom. Res.* 1954, Dec., v. 45, Pt. 4, 757–68, 2 figs.

Lewis, D. J. **Muscidae of Medical Interest in the Anglo-Egyptian Sudan.** *Bull. Entom. Res.* 1954, Dec., v. 45, Pt. 4, 783–96, 3 figs. [59 refs.]

The author has added one more to his scholarly papers on insects of medical importance in the Sudan [this *Bulletin*, 1952, v. 49, 376; 1953, v. 50, 769, 858; 1954, v. 51, 741, 743]. Here he deals with the Muscidae from the point of view of their geographical distribution and biology. The paper refers to 86 species belonging to 22 genera, from which it will be seen that many insects are included of which the relation to medicine is rather remote.

In the Sudan there is no Muscid known to cause myiasis of man or domestic animals. Cattle trypanosomiasis in the absence of *Glossina* is widely distributed in the great grass plains of the Sudd, and the author has wisely given attention to the possibility that transmission may be by blood-sucking Muscids such as *Stomoxys* and *Lyperosia*. More information has also been collected about certain species of *Musca* which are unable to pierce skin but which drink blood and other liquids from injuries: *M. conducens* is an example.

As to *Musca domestica* and its immediate relations, it is pointed out that breeding is limited in the hot, dry climate of the Sudan, because small amounts of excrement or refuse dry quickly when exposed to the sun. It follows that isolated deposits of human faeces are likely to be a source of flies on the damp soil near rivers but hardly so in open dry places in the central Sudan. A considerable amount of work was carried out in Omdurman and Khartoum on Diptera breeding in pit latrines. Larvae of *Musca* were surprisingly rare, being found in about 2–4 per cent. of a very large number of pits. In Khartoum where the water table may be high, many aquatic larvae of other flies occurred which, it is thought, may have reduced the incidence of *M. domestica*. In the authors' experience house-flies seldom breed in single deposits of cow manure but large numbers of larvae may be found in heaps of manure. The mixture of cow dung and stable refuse which is allowed to ferment and then used for plastering mud buildings produces many house-flies. The insect (contrary to what has been observed in other climates) does not breed abundantly in horse manure. Small deposits dry quickly, and if the manure is mixed with much bedding certain ants gain access to it and will kill larvae of *Musca*. Cotton seed is not generally allowed to accumulate, but if it does so and becomes wet, it is attractive to *Musca* which breeds in it readily. *P. A. Buxton*

McKenzie, R. E. & Hoskins, W. M. **Correlation between the Length of the Larval Period of *Musca domestica* L. and Resistance of Adult Flies to Insecticides.** *J. Econom. Entom.* 1954, Dec., v. 47, No. 6, 984–92, 2 figs. [13 refs.]

Two moderately DDT-resistant strains of house-fly were each divided into 4 sub-colonies. One of each was maintained normally; one was selected for resistance to DDT by incorporation of that insecticide into the larval food; one was selected to obtain a short larval period, by breeding always from the flies which pupated earliest; and the fourth colony was selected for a long larval period, by breeding from late pupating flies. The effects on DDT resistance and larval period were noted at intervals. After about 15–20 generations it was found that the strain selected for early pupation had slightly reduced its larval period, and its DDT resistance had declined. The strain selected for delayed pupation had increased its larval period by about 50 per cent. and had increased its resistance to DDT some 6–8 times. A similar and greater increase in resistance to DDD was noted but not a corresponding increase to methoxychlor, lindane, aldrin, dieldrin or pyrethrum. The DDT-selected strains increased their resistance to DDT without appreciably increasing the larval period.

Selection for long larval period was continued for a further period up to the 53rd generation. This had the curious result of decreasing the larval period and the resistance to DDT, both of which eventually fell below the normal. *J. R. Busvine*

LeRoux, E. J. & Morrison, F. O. **The Adsorption, Distribution, and Site of Action of DDT in DDT-Resistant and DDT-Susceptible House Flies using Carbon^{14} Labelled DDT.** *J. Econom. Entom.* 1954, Dec., v. 47, No. 6, 1058–66. [21 refs.]

Small quantities (usually 1·5 μgm.) of radio-active DDT were applied topically to various parts of house-flies. The subsequent location of the DDT (or its metabolites) was determined by radio-activity. By these means, the penetration and distribution of the insecticide were studied and related to the lethal effect.

As might be expected, the penetration of the DDT was related to time of contamination and the area treated (a small supersaturated drop was absorbed more slowly than one from the residue of a dilute, spreading, solution). DDT penetrated and dispersed from the labellae faster than from the legs.

When the DDT had penetrated, it was dispersed, apparently by the haemolymph, which carried it to other regions of the body; this dispersion was more rapid in susceptible than in resistant flies. DDT (or its metabolites) was found in several parts of the body and seemed to be readily absorbed from the haemolymph by cuticular tissue. Small amounts were found in fly faeces, especially in the resistant strain, but none in respired CO_2.

Several results indicate that the head is the site of lethal action of the DDT. The toxicity of the DDT increased as the site of application was moved closer to the head. Also, ligaturing the neck region, which prevented haemolymph from circulating, reduced mortality after application of DDT to the leg. The susceptible flies suffered 50 per cent. mortality at a time when 0·05 μgm. DDT was estimated to have reached the brain by topical application or, alternatively, if this minute quantity were applied direct through the cavity of an excised labellum.

The *difference* in mortalities between normal and resistant flies decreased, the nearer the site of application of DDT was to the fly brain. All these results suggest that DDT-resistance is a complex phenomenon depending on a number of factors which may include: reduced penetration and slower internal distribution of DDT, greater degradation and excretion of DDT, and some unknown factor which still protects resistant flies (to some extent) when the DDT is applied direct to ganglia. *J. R. Busvine*

Oppenoorth, F. J. **Differences between Rates of Metabolism of Benzene Hexachloride in Resistant and Susceptible Houseflies.** [Correspondence.] *Nature.* 1955, Jan. 15, v. 175, 124–5, 1 fig.

Flies resistant to gamma BHC have been shown to metabolize this compound more rapidly than normal flies; but it is not easy to know if this is a cause or an effect of the resistance. It is not technically possible to follow metabolism of gamma BHC at the very low doses necessary to obviate mortality among the susceptible flies. However, the metabolism of other isomers could be studied at non-lethal doses and they might be degraded by the same mechanism as gamma BHC. Accordingly, peanut-oil solutions of alpha and delta BHC were injected into flies and their degradation was estimated at various intervals afterwards. The fly strains tested were S (susceptible); R_1 (resistant to gamma BHC); and R_2 (resistant to DDT and gamma BHC). The results of a number of experiments given in a table may be summarized as follows:—

		Percentage Breakdown		
Isomer	*Interval*	S	R_1	R_2
alpha	4–5 hours	23–45	57–80	50–60
delta	18½ ,,	25–29	37–47	32–46

For further proof of the influence of metabolism on resistance, tests are required with strains at different levels of resistance. *J. R. Busvine*

Fay, R. W. & Lindquist, D. A. **Laboratory Studies on Factors influencing the Efficiency of Insecticide Impregnated Cords for House Fly Control.** *J. Econom. Entom.* 1954, Dec., v. 47, No. 6, 975–80, 1 fig.

Since flies have, in many countries, become resistant to chlorinated hydrocarbon insecticides, the use of phosphorus insecticides has been considered. Many of these are toxic for residual spraying and others are expensive and not as persistent as DDT. Therefore, for safety and economy, they have been used on restricted surfaces such as strips of crêpe bandage [Wichmand, this *Bulletin*, 1954, v. 51, 322] or cotton strings [Bechtel and Grigarick, *ibid.*, 1202] hung from the ceiling. Pursuing the latter idea, the authors have tested various kinds of cords to determine their attractiveness as fly resting places.

In cage tests, they found that sisal or cotton strings were preferred to jute or wool. With cords ranging from 3/64 to 7/16 in. (1·2 to 11 mm.) in diameter, attractiveness increased with thickness of cord. Red or black cords were chosen rather than green, blue, yellow or white ones. Cords soiled with fly faecal spots had more attraction than cords treated with various attractants.

Cords impregnated with parathion or Diazinon (by dipping in 10 per cent. xylene solutions) were slightly repellent, but not enough to prevent their effective destruction of flies. Parathion gave complete kills for 41 weeks with a 60-minute exposure and Diazinon produced over 90 per cent. mortality for 26 weeks. Several other compounds were tested in the same way, but found less promising. *J. R. Busvine*

See also p. 485, Daniel *et al.*, Beitrag zur Lungenakariasis des Menschen. [**Lung Acariasis in Human Beings**]

Colonial Office. **Colonial Research 1953–1954. Colonial Insecticides, Fungicides and Herbicides Committee. Seventh Annual Report (1953–1954)** [Hall, W. J., Chairman] (pp. 195–220). Cmd. 9303. 278 pp. 1954, Oct. London: H.M. Stationery Office. [7s. 6d.]

After summarizing staff changes and the general work of the Committee, the report reviews progress in research at various centres. The Unit at Porton in England has been studying further the absorption and inactivation of DDT residues on dried mud from different sources; these effects vary greatly in different samples, even those originating in the same country. A simple method of sampling wall residues by applying adhesive tape to the wall has been developed. Other work at Porton has been the investigation of different types of insecticidal pellets suitable for applying mosquito larvicides, especially from aircraft. Another field of research has been the development of long-lasting insecticidal films in urea-formaldehyde resins.

At Imperial College Field Station, Silwood Park, England, fundamental investigations have explored the penetration of DDT through insect cuticle and its internal diffusion from the site of contamination. Another investigation concerns the influence of oil and other residues on the pick-up of crystalline insecticides by insects. A study of the principles of olfactory stimulation of tsetse flies has also been initiated.

At Long Ashton Research Station, England, the adhesion of various fungicidal deposits to foliage under natural conditions has been investigated.

At Rothamsted, England, it has been shown that evaporation of DDT is an important factor in the decline of insecticidal efficiency of residual films, especially in the lighter dosage range. Methods of reducing this loss without affecting the toxicity of the film are being tested.

The Colonial Office Research Unit in East Africa has carried out an aircraft spraying trial to eradicate tsetse from a 40 sq. mile zone at the end of an extensive fly belt. Eight applications of DDT have resulted in a 99·96 per cent. reduction in tsetse; the remaining flies may possibly be immigrants rather than survivors. This has cost £18,000 or 35/- per acre treated. [Readers of this *Bulletin* will be familiar with this work.]

In Mauritius the ecology and behaviour of *A. gambiae* are being further studied and the effects of residual spraying by DDT and dieldrin are also receiving attention.

In Malaya, *Mansonia* spp. have been confirmed as the vectors of rural filariasis caused by *W. malayi*. Experimental huts in Eastern Malaya have been found very suitable for studies of these mosquitoes, which enter them in large numbers. Other work in Malaya, not under the aegis of the Committee, has concerned the relative efficiency of residual insecticides to local mosquitoes. Field and laboratory work has shown the high efficiency of dieldrin, 40 mgm./sq. ft. of which is better than the same rate of gamma BHC or 200 mgm./sq. ft. DDT. All tests show the low susceptibility of *C. fatigans*, especially to DDT, in both the larval and adult stage. Dieldrin or gamma BHC is used as a larvicide for this mosquito, but a BHC-resistant strain has been discovered in Penang.

In Fiji a preliminary programme of research on filarial vectors has been started.

The report also gives considerable information about agricultural matters of interest to the Committee. The only aspect of these data which concerns tropical medicine is the research on herbicides and defoliants which have some relevance in relation to tsetse fly control. *J. R. Busvine*

Dowling, M. A. C. **Insect Repellents and Miticides.** *J. Roy. Army Med. Corps.* 1955, Jan., v. 101, No. 1, 1–15. [62 refs.]

A general review.

Vermeil, C. *Gerbillus hirtipes* Lataste, nouveau rongeur de laboratoire. [*Gerbillus hirtipes* **as a New Laboratory Rodent**] *Ann. Inst. Pasteur.* 1955, Jan., v. 88, No. 1, 137–9.

Gerbillus hirtipes is a rodent of the Sahara: many species of gerbils have been proved to cover a wide range as hosts susceptible to several viral, rickettsial and parasitic infections. Most of the gerbils used experimentally have been captured wild, but the author has succeeded in breeding this species in the Pasteur Institute in Tunis. The strain was originally obtained from wild species in the Libyan Sahara in 1951 and is now in the 10th generation.

Details are given of general conditions for breeding, the reproductive cycle, mating, handling of mothers and infant animals, feeding and general features.

No particular epizootic has been observed during breeding and the loss of animals by death has been only 10 per 100 births. This gerbil does not seem to be susceptible to *Salm. typhi-murium* infection, though this has not been proved experimentally.

It is suggested that *G. hirtipes* should prove a useful laboratory animal for the study of many infections. *H. J. O'D. Burke-Gaffney*

MISCELLANEOUS PAPERS

Babumba, E. M. **An African Patient.** *East African Med. J.* 1954, Aug., v. 31, No. 8, 373–6.

This short paper by an African doctor in Uganda is an important reminder that the common African conception of the cause of disease is almost entirely related to evil spirits, witchcraft, taboo and the power of enemies. These beliefs are taught from childhood and are firmly held, and it is essential for the proper understanding of the Africans, and for the treatment of many of their psychological and physical ailments, that the fact of the supreme importance of these beliefs should be appreciated. Doctors should not expect their patients to give accurate histories of illness, especially if they allow it to be seen that they do not understand the traditional background. The paper is particularly important because it is written by a man with intimate knowledge of the situation; it is to be hoped that he will publish detailed information on the same lines. *Charles Wilcocks*

REPORTS AND SURVEYS

Banks, A. Leslie [M.A., M.D., F.R.C.P., D.P.H.]. [Edited by.] **The Development of Tropical and Sub-Tropical Countries with particular reference to Africa.** pp. xvi + 217, 10 figs. (1 on pl.). 1954. London: Edward Arnold (Publishers) Ltd., 41, Maddox Street, W.1. [18s.]

The above title was the subject of discussion at an informal seminar attended by 32 participants with a wide variety of backgrounds. Seven sessions were held, each concerned with a different aspect of the problem, at which, after an introductory talk, free discussion took place. The proceedings were recorded mechanically and are reproduced here.

The first session was concerned with a broad review of the problems inherent in the development of tropical Africa. Special attention was paid to the difference between European and African values. It was agreed that development should not be judged in economic terms alone but in relation to the quality of the society produced, and during the planning stage its impact on all aspects of social life should be considered so that a high quality of individual and community life might be created in terms of the people's own philosophy.

The second session dealt with the objectives and limitations of technological development. It was emphasized that a sound political, social and economic background is necessary and that there is always the possibility of far-reaching and unexpected effects being caused by such progress. Too often the people do not realize the need for development, and they must understand and assist if the best results are to be produced. The co-operation of all departments also is essential, particularly between the technologist and social scientist.

Power and water were discussed next. This subject could be considered at two levels, the domestic or village level and the regional hydro-electric scheme. Domestic or village supplies can be developed largely by self-help schemes but the bigger schemes require large capital investment. Africa's need is for small schemes widely distributed because these develop Africa for the Africans. There was a discussion on the sources from which investment capital may be obtained and the motives for investment from outside Africa.

Food and its production was the next subject. It was pointed out that in many places more food must be provided to produce the energy for the increased food production needed to feed the expanding population. Much energy and time are consumed in routine domestic work, such as food preparation, which could be saved by devising suitable apparatus or marketing an acceptable, prepared article. Ways of increasing food production were considered. The potential rate of capital formation in under-developed countries was also considered.

Health and welfare were discussed and the dearth of vital statistics was emphasized. It was agreed that deliberate public health measures had in recent years caused a radical decline in mortality. When eventually birth and death rates again become stabilized the population will have an age structure very different from that of the primitive state of stability. The proper function of the graduate doctor in under-developed communities was considered and it was suggested that he should be occupied in training and inspecting rather than in executive duties. The main medical staff should consist of less elaborately trained assistants. Medical education should be based on a curriculum better adapted to the tropical and economic environment than that of western countries. The great need for health education was stressed, because until the African understands that disease is infective he will not cooperate in raising sanitary standards.

A session on education followed. The curriculum had been criticized on the ground that it turned out too many " white-collared " people, many of whom would have profited more by practical training. This bookish bias, however, was partly the result of pressure from the people themselves, who had passively resisted practical education. This is now decreasing as technological development proceeds. The problems of training for leadership were discussed, and it was suggested that lack of ambition, of knowledge and of moral fibre are factors inhibiting the development of leaders. Potential leaders must be provided with the specific skills and shown their function in the community, and their imagination must be fired. Responsibility must be devolved on them very gradually so that they can gain assurance.

The final session dealt with possible lines of action, and each participant contributed his opinion. Each tended to think in terms of his own background but there was general emphasis on the lack of basic data and the need for surveys. The complexity of the problem was universally recognized and the need for research. The value and importance of self-help schemes were stressed.

These discussions should be read by everyone concerned in the development

of Africa or any other under-developed tropical region. In this review it has been possible to mention only some of the more important subjects of discussion but there were many other interesting and valuable contributions. The comments of specialists representing more than a dozen different fields will provide every reader with aspects of the various problems which he had not considered. No solution of the problems was put forward but certain basic principles emerged. Although it was recognized that the rate of progress is determined by factors outside the control of those responsible for development, the attempt should be made to maintain moderate, steady progress and to preserve a balance of all important factors.

T. H. Davey

Macdonald, G. **Medical Implications of the Volta River Project.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 13–24. [12 refs.] Discussion 24–7 [McRobert, G.; Dunlop, R. Y.; Wilcocks, C.; Mercer, T. M. K.; Macdonald, G. (in reply)].

This paper is concerned with the medical problems likely to arise when the Volta River is dammed with consequent flooding of some 2,300 square miles of land, and large labour forces drawn from agricultural communities become aggregated into industrial centres. The subject is considered under two heads: the medical implications of water management and of industrial development.

In the area to be inundated some 35,000 people will require to be resettled and protected from diseases which may result from the flooding. The major problems in this field are likely to be onchocerciasis, malaria, trypanosomiasis and schistosomiasis. About 68 per cent. of the population in the development area are infected with onchocerciasis [this *Bulletin*, 1951, v. 48, 1031; 1952, v. 49, 168], and the greatest need will be to prevent transmission on the site during construction because subsequently the rapids will be submerged. *Simulium* breeding will then be possible only in the overflow channels where control can be achieved by maintaining a rate of flow too great to permit breeding. Larvicidal control with DDT will be employed during construction and it is hoped it will be sufficiently effective when the river is at low level to forestall breeding during the flood season when larviciding would be impossible. If it fails air-spraying against adults will then be carried out.

Breeding places for *Anopheles gambiae* and *A. funestus*, the local malaria vectors, will be created by the variations in the water level. The control methods used in the Tennessee Valley would be impracticable and residual insecticidal spraying is the measure proposed. Trypanosomiasis has spread in sleeve form along communication routes only so far as the upper limit of the proposed lake, although *G. palpalis* is common over a much greater area. Since migration towards the lake might spread the disease it is proposed that vegetation should be cleared backwards along the sleeves to limit the sources and migration of possibly infected tsetse. Places where travellers are likely to gather on the northern shores of the lake will be cleared of bush and a mass treatment campaign will be carried out in the area. Control of schistosomiasis will be attempted by the provision of water supplies to villages near the lake, by the creation of an organization for early detection of colonies of snail vectors and by molluscicidal treatment of these and of points likely to be frequented on the lake shore. In addition, routine surveys will be made to detect and treat cases of the disease. Within the Health and Safety Division of the administrative organization of the project there will be formed a Lakeside Health Section

under an epidemiologist, which will include medical and biological staff for early analysis of any problems which might arise.

The large problems associated with the industrial development of the area were discussed but they cannot be summarized satisfactorily and should be read. Control measures include the creation of Industrial Hygiene and Sanitation Sections of the Health and Safety Division.

In the discussion which followed it was noted that there would be more doctors in the development area than in the whole of the rest of the territory. Crowd diseases—tuberculosis, venereal disease, malnutrition and intestinal infections—would be the greatest danger, and it was suggested that employees showing a very strong tuberculin reaction should be excluded from heavy work. In reply the speaker pointed out the necessity for medical services of high standard when industrial development is undertaken. The prevention of crowd diseases depended on the prevention of slums and this would be the responsibility of the Health Division. *T. H. Davey*

USBORNE, V. **Home and Dispensary Findings in a Survey of Wasukuma Children.** *East African Med. J.* 1954, Dec., v. 31, No. 12, 531–6, 3 figs.

Dr. Vivian Usborne decided to record the findings in 629 children under 11 years seen in their own homes, and in about 300 children attending a nearby dispensary. The survey was undertaken in the dry season in the rolling cattle plains of the Kwimba District of Sukumaland to the South of Lake Victoria in Tanganyika. The staple diet was maize and millet.

Among the children seen at home the common conditions were rhinorrhoea, splenomegaly, pot bellies, umbilical hernia, hypochromotrichia and mild xerosis. Cheilosis and indented tongues were sometimes seen. There was no case of kwashiorkor among the 629 children examined. Some of the more common complaints found were:— haematuria, 9 per cent.; fever/cough, 8·7 per cent.; cough only, 8·5 per cent.; minor injury, 1·5 per cent. Clinical findings of interest were: splenomegaly, 87 per cent.; palpable liver, 11 per cent.; fluorosis, 1·8 per cent.; skin disorders (ringworm, scabies, eczema, alopecia areata and tinea versicolor), 5 per cent.; conjunctivitis, 4·5 per cent.; dental caries, 2·7 per cent.; umbilical hernia, 8 per cent. Anaemia was slight in spite of the high incidence of *S. haematobium* and positive blood smears for malaria, which would have led one to expect a lower haemoglobin level. Hookworm eggs were found in 30 per cent. of stools, but again this infection seems to have had little effect on the haemoglobin level. *Ascaris* was found in only 6 per cent. of the stools and *S. mansoni* was rare. The children appeared to be little disturbed by schistosome infection although 90 per cent. of schoolchildren were infected.

In the children attending the dispensary, the findings revealed malaria in 45 per cent., cough in 12·9 per cent., congenital syphilis in 5 per cent., conjunctivitis in 3·8 per cent., fever of unknown origin, probably malaria, in 5·5 per cent.

It was difficult to assess the importance of the high incidence of malaria and schistosomiasis. As 4·4 per cent. of children in the survey had conjunctivitis and only 3 per cent. of those at the dispensary, Usborne considered that attendance at the clinic for this complaint should be higher. The parents are either apathetic or prefer the remedies of the native medicine man. He suggests that, for very little cost, if the headmen and even African medicine men were given instruction in the simplest hygienic

management of discharging eyes, blindness and corneal opacities could be avoided or considerably reduced. *M. Gelfand*

McCarthy, D. D., Marples, M. J., Bacon, D. F. & Fitzgerald, N. **Researches in Western Samoa. I. General Sanitation and Intestinal Parasites.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 71–5.

This paper gives a short description of living and sanitary conditions in a village of Western Samoa, and of the physical health of the villagers. The authors examined 210 samples of faeces for helminth parasites and 59 per cent. gave positive findings. Infection with *Ascaris* was present in 31·4 per cent., with *Trichuris* in 31·9 per cent., and hookworm infection showed an incidence of 15·7 per cent. compared with 85 to 95 per cent. in 1926 [this *Bulletin*, 1929, v. 26, 417]. Infection was probably contracted on the beaches. Many of the latrines in seaside villages in this area are built out over the water but in this village they are exposed to the full force of the Pacific and consequently have to be sited so close to high-tide level that the beach is fouled.

Examinations for protozoa number 168, and 18·5 per cent. were positive. *Entamoeba coli* (11·9 per cent.) and *E. histolytica* (4·2 per cent.) were much less prevalent than in previous surveys [this *Bulletin*, 1923, v. 20, 5, 891; 1929, v. 26, 436] and the individual parasite load was also diminished. The decrease in incidence of intestinal parasites is believed to be due to the introduction, about 1920, of latrines built out over the sea, but where they are not protected by a reef, as in this village, the full efficiency of disposal into the sea is not achieved. *T. H. Davey*

Sergent, Ed. Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie en 1953. [**Annual Report of the Pasteur Institute of Algeria for 1953**] *Arch. Inst. Pasteur d'Algérie*. 1954, June, v. 32, No. 2, 142–88, 1 chart. [22 refs.]

This report opens with an impressive tribute to the memory of Dr. E. Roux, colleague of Pasteur, the centenary of whose birth occurred in 1953, and who founded the Pasteur Institute of Algeria in 1909.

The report proper follows the usual lines [this *Bulletin*, 1953, v. 50, 1103] and contains the customary review of research work undertaken in the Institute, with which readers of this *Bulletin* will be familiar through its publication in the medical literature.

In the part of the report which sets out the account of administrative matters, medical campaigns and the like, there is given a list of the strains of micro-organisms maintained at the Institute.

There were 17,402 medical and veterinary investigations, of which 8,212 were microbiological, 2,055 histological or biological, 5,560 chemical and 1,575 zoological. There is the usual list of issues of vaccines, sera and other biological products.

There is an interesting note on a severe outbreak of malaria which occurred suddenly in September 1953, after nearly 3 years of reduced malaria incidence in the Territory as a consequence of effective control measures.

This outbreak took place at Mzab, where the bed of the *wadi* is ordinarily dry, and was attributable to a long period of heavy rains with consequent flooding. Epidemic malaria had not hitherto been recorded at Mzab, but rapid breeding of *Anopheles multicolor* now occurred and in three towns

in the area with a total population of some 6,900 persons, there were 1,000 cases of malaria and 150 deaths, most of them in Bou Noura (1,400 population). In 140 blood smears examined, *P. vivax* and *P. falciparum* were found, with the latter predominating. The serious effects of hydrological changes of this nature are stressed, particularly as regards a population without premunition.

As anti-rabic vaccination can now be done by doctors outside the Institute with vaccine received therefrom, only " individual observations " have been received so far. Among 1,595 such, which are analysed according to the origin and nature of the bite, it is reported that there were 9 deaths, 7 of them more than 15 days after the end of treatment. Five untreated persons died of rabies. One relatively mild paralytic accident was reported. This took the form of a polyneuritis of the arm which occurred 2 months after treatment and was not completely cured after 6 months.

H. J. O'D. Burke-Gaffney

See also p. 438, Colonial Office, **Colonial Research 1953–1954. Tsetse Fly and Trypanosomiasis Committee. Report for 1953–54.**

BOOK REVIEWS

Trowell, H. C. [O.B.E., M.D., F.R.C.P.], Davies, J. N. P. [M.D.] & Dean, R. F. A. [Ph.D., M.R.C.P.] **Kwashiorkor.** pp. xii + 308, 28 figs. 1954. London: Edward Arnold (Publishers) Ltd., 41, Maddox Street, W.1. [50s.]

This is the first book on kwashiorkor which deals at great length with all the aspects of the disease. The history and origin of the name, the natural history of the disease, the clinical picture, differential diagnosis, the pathological anatomy, biochemical changes, treatment and prevention are all fully discussed. Each of the authors writes with great experience of the disease in East Africa and a bibliography of over 600 references indicates that the international literature has been fully reviewed. The book is written in an easy style that comes only with authority.

The regular reader of this *Bulletin*, who has been following the growth of the conceptions of kwashiorkor over the last decade, will be unlikely to learn much that is new from this book. He will, however, appreciate having so much useful information brought together in one volume. But the book is meant for and merits a much wider public. There can be little doubt that kwashiorkor is the most important children's disease in the world today. No other single disorder can be responsible for so much ill health and suffering in childhood (with the possible exception of malaria). A recent search of 5 major British and American text-books of paediatrics showed that kwashiorkor was to be found in the index of only one and here the pages allotted to the disease represented 0·11 per cent. of the length of the book. Trowell, Davies and Dean in discussing the prevention of kwashiorkor write: " The education of doctors and their staffs in the recognition of the disease is of prime importance. Because kwashiorkor has not been common in European and North American countries, where a large proportion of the world's doctors have been trained, it has been usual for tropical hospitals to be staffed with doctors who have never heard of it. . . ."

Editors of text-books of paediatrics, and university professors in the subject, will find in this monograph a full and clear account of a disease which they must no longer neglect.

The public health nurse and the dietitian, upon whom falls so much of the work of prevention and treatment of the disease, can each obtain here much detail and practical information, essential for their work.

The text has 28 figures, many of which are clinical photographs and photomicrographs of histological material. They are beautifully reproduced. The whole book is well printed on art paper and a credit to the house of Arnold. *R. Passmore*

Ellerman, J. R., Morrison-Scott, T. C. S. & Hayman, R. W. **Southern African Mammals 1758 to 1951: a Reclassification.** 363 pp., 3 maps (2 folding). 1953. London: British Museum (Natural History). [40s.]

The area covered in the present study is Southern Africa up to and including Angola, Northern Rhodesia and Nyasaland. Within that area the authors recognize the occurrence of 350 species of mammals.

The book is essentially taxonomic. Under each order there are keys to genera and under them to species (except when only one species of the genus occurs in the area). Geographical distribution based on specimens examined is given fully under species.

It is evident that the authors have found considerable difficulty in arriving at a uniform treatment of races in different groups of mammals and in their introduction they discuss criteria on which these units may be recognized. Their conclusions are more conservative than those of Roberts (*The Mammals of South Africa*, 1951, Johannesburg: Trustees of *The Mammals of South Africa* Book Fund) and they take the view that that author tended to describe new races or subspecies on insufficient evidence.

The reader with sufficient technical knowledge will find the book exceedingly valuable. May we express a hope that the Museum has seen fit to publish a sufficiently large edition, having regard to the increased number of zoologists and particularly of medical biologists who wish to have information on the mammalian fauna of tropical countries? *P. A. Buxton*

Horsfall, William R. **Mosquitoes. Their Bionomics and Relation to Disease.** pp. viii + 723. 1955. New York 10: The Ronald Press Co., 15 East 26th Street. [$16.00.]

This is a remarkable compilation of the published information on both anopheline and culicine mosquitoes. The bulk of the book consists of well-documented digests of the literature on species throughout the world, beginning with those of the genera *Chagasia*, *Bironella* and *Anopheles* and continuing through the numerous culicine genera; species are arranged alphabetically within subgenera. The text about each species follows a pattern of presentation (the skeleton scheme of headings is set out in the introduction of the book) beginning with general considerations of subspeciation, distribution and the like. The egg, larva, pupa and adult are then taken in that order and the matter presented under various headings, of which there are 13 for the larvae and 20 for adults and fewer for eggs and pupae. The amount of information given varies from species to species according to medical significance, distribution geographically, researches

done on or with a species, and so on. Thus, about 25 pages are given in each case to *Aëdes aegypti*, the *Culex pipiens* group, the *Anopheles maculipennis* group and *A. quadrimaculatus*, while about 10 pages each deal with *A. gambiae* and *A. culicifacies*. Many species are, however, accorded a page or so or less.

A great deal of information for little known species (or subgenera) is restricted to tables which give such facts as geographical distribution, breeding places, and a reference to literature. The index at the end of the book to genera and species is virtually a catalogue of mosquitoes of the world arranged alphabetically first by genera, and then by species alphabetically within generic heads; for completeness this index includes species not otherwise referred to in the book.

Tables—there are over 200 tables—compress much information (with literature citations) and apart from those mentioned above many of them deal with mosquitoes in relation to organisms of disease—yellow fever, the encephalitis viruses, Rift Valley fever, dengue, and the many viruses isolated in the past 10 years or so. Characteristic of this book, all these tables follow a pattern. This shows the mosquito species which have been shown to transmit the organism, whether in the laboratory or from field facts, by salivary or inoculative route, and the geographical range of the insect, and a reference for each entry in the table. Other tables, again well documented, summarize cross-mating of various species groups; recorded incidences of *Plasmodium* spp. in *Anopheles* (a valuable table for each species of mosquito concerned) and of *Plasmodium* spp. in *Culex*; filarial infections (human and *Dirofilaria*) in mosquitoes; and there are some brief tables on hosts of some mosquito species. In an opening chapter which presents mosquito biology as a general topic there are further tables condensing, with references, information on parasites, other than human pathogens, and on predators of mosquitoes as adults and in the larval stage.

The references are brought together at the end of the book and number about 4,000—a selection of some 12,000 which the preface to the bibliography indicates were " scanned " in the course of preparing the book. In a few cases, marked by asterisks, the facts recorded in the book are taken from abstracts in the *Review of Applied Entomology* (Series B) or this *Bulletin*. Apart from the index to genera and species a very brief but satisfactory index gives the pagination for the principal parts dealing with generic and subgeneric features and also organisms transmitted by mosquitoes, as well as their parasites and predators.

There is a section on techniques which is a useful guide to the literature, and though not descriptive of methods it shows clearly the range of techniques, both laboratory and field, which have been in use by workers on mosquitoes. Considerable emphasis seems to have been given to quantitative methods of survey and study which is valuable and commendable. [The heading for the section on techniques for larvae seems to have been accidentally omitted on p. 610.] The references in this appendix include cage-colony methods for 20 species of mosquito. Finally, a glossary defines about 150 terms commonly used in mosquito literature.

So far as has been noted, the nomenclature adopted is balanced and conservative. Thus, the various races of *A. maculipennis* are referred to as *A. maculipennis atroparvus*, etc., and not as *A. labranchiae atroparvus*, etc., the former coming a good deal easier by custom and usage to at least the reviewer. On the other hand, the index makes it clear that the second nomenclature now intrudes in the systematics of this complex and, moreover, it gives the reference for those who are anxious to consider the claims

for further departure from custom. *Toxorhynchites* is accepted for *Megarhinus* but, pending revision of the group, *Mansonia* is preferred to the commonly accepted *Taeniorhynchus*.

The book is substantially a reference book; it undoubtedly meets its intention very successfully of providing a baseline of coordinated literature from which a worker could readily see much, if not all, that is important in past work on most species of mosquitoes. Particularly in the tables on malaria infections in anophelines, there is a body of raw quantitative data on infection rates of guts and glands which might well be a source of interest and fact to the statistical mind. It is well printed and appears to be extremely carefully thought out to make the most of space without sacrifice of information. The tables, indices and arrangement of text information in systematic patterns contribute much to this success. At 16 dollars [£5 14s. 0d.] it is expensive for the individual but must certainly be included in the library of any unit or institution interested in mosquitoes and mosquito-borne diseases. The compactness and condensation in a book of this comprehensive nature imply some risks of misleading abbreviation of original papers. It was noticed, for example, that the breeding of *Anopheles gambiae melas* depends, it appears to read, on the 12-hourly tidal ebb and flow. This is true but only at the fortnightly (or monthly) very high spring tides which flood beyond the normal high water level. Presumably, there may lurk in the text other statements which almost necessarily suffer a little from the condensation to which they are subject. No doubt the author will hear about them. This seems inevitable but one would suppose it is the function of the research worker, if not other readers, to consult the original literature cited for any species with which he intends to work in the laboratory or the field.

It occurred to the reviewer that a useful addition to the appendices might be some presentation—possibly in tabular form or by a geographical index—of at least the commoner anophelines and culicines for major geographical regions or, perhaps, even for principal continental masses and island groups. Distribution is well presented under species, and more generally, too, for a genus as a whole, but it could be a considerable task for a reader to find what to look out for in any selected country. These critical comments are minor compared to the remarkable service which this book provides as a comprehensive compendium of abundantly documented information for workers in virtually all fields of mosquito work and research, with the exception of the systematist who will find little or nothing, certainly no illustrations, to assist in the recognition of mosquitoes. That is beyond the intended scope of the book. *D. S. Bertram*

Rodenwaldt, Ernst. [Edited by.] **Welt-Seuchen-Atlas.** [World-Atlas of Epidemic Diseases] **Part II.** 1st issue. pp. II/5–II/12, II/47–II/50, II/67–II/72, II/85–II/100, II/127–II/140, II/163–II/168, 14 text figs. + 10 folding pp. of coloured maps. 1954. Hamburg 1: Falk-Verlag, Burchardstrasse 8. [In German & English.] [DM. 57.50.]

The general character and scope of this ambitious work were described on the publication of the first part [this *Bulletin*, 1953, v. 50, 772]. Part II continues in the same form and includes material on bacillary dysentery in Africa by Seeliger, relapsing fever in Europe by Martini, smallpox in Europe by Henneberg, rabies in Central Europe by Boeker, trachoma in Africa by Siebeck, Bornholm disease in Europe by Finger, African trypanosomiasis by Kunert, Chagas's disease by Dias, and population distribution in the U.S.A. and adjoining territories by Burgdörfer.

For each of these there is a considerable text statement in both English and German, typically of 5,000 to 10,000 words, and with its own bibliography, 1 or 2 major (24″ × 18″) multicoloured maps and 4 to 8 lesser line maps. The major maps attempt to set out distribution in space, or space and time, by the application of such devices as hatching and diagrammatic symbols. The exact methods differ from one map to another, and not all are self-explanatory, with the result that the symbols for each have to be committed to memory separately. With this effort, most of them make an appreciation of distribution much easier than it would be by the purely textual approach. The Editor is, however, still feeling towards an approach rather than using an established method confidently; this results in such contrasts as that between the simple and lucid demonstration of the single relapsing fever epidemic of 1922 and the complicated effort to display half a century's statistics of bacillary dysentery in Africa by the use of 15 symbols. Taking the maps individually, however, the production is excellent and the impression given reflects reasonably what is known of the distribution of the disease concerned, or the recorded statistics of it.

It is pertinent at this stage to enquire whether the objective of continuing an authoritative display of geographical pathology on the standard of Hirsch but by other means is being achieved. In some cases it is at least being approached. The student of Chagas's disease can quickly grasp the distribution of human, animal, and insect infections with *Trypanosoma cruzi*, and by a simple reference mechanism could trace the source of the material displayed and elaborate its detail; he could do this despite the fact that the text almost eschews reference to distribution, dealing largely with parasitological, entomological and pathological matters. In other cases, and perhaps in most, the objective is not even approached. African trypanosomiasis lends itself readily to cartography and the maps are clear and simple. The text attempts an account of past happenings in every African territory and succeeds in brief statement, but in a virtually undocumented form; there are only two references in the section on the Gold Coast, dated 1912 and 1924. There is no evidence that the work of such men as Morris and Nash has been consulted; if it has, there is no means by which the student could be directed to it. Bacillary dysentery in Africa, unlike these two, is not readily displayed in map form because the basic evidence is far too fragmentary, discontinuous and uncertain; prolonged study of the map is almost useless and the reviewer failed to trace in the text the background or reason for some points shown, such as the transport of dysentery from India to Africa in the 19th century.

The method, when aptly used, can therefore facilitate and lighten the labour of study and if combined with a proper reference system can replace much of the textual description developed by Creighton, the classic example, who is to be studied with pleasure and profit, and Hirsch who can be studied with profit. The achievement is not uniform, including what must be rated as failures as well as successes, but the correct approach is becoming clarified. In the ideal series the matter on each map would be restricted, with no attempt to describe distribution in both space and time in a single map; line maps might be increased at the expense of the more ambitious multicoloured ones. Most important, a reference and bibliographical system would enable the student to trace the source of material displayed and enlarge upon it. With some such development from the more successful productions the Editor might well achieve his object. *G. Macdonald*

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